WORLD'S POULTRY SCIENCE JOURNAL

OCTOBER - DECEMBER

1955

Official Organ of the

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Volume 11 - Number 4

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Volume 11 October-December Number 4

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Published quarterly by the

WORLD'S POULTRY SCIENCE ASSOCIATION

Cornell University, Ithaca, N. Y., U.S.A.

Membership dues $3.00 a year of which $2.50 is for a year's subscription to the "World's Poultry Science Journal." Subscription rate, $3.50 a year. Advertising rates upon application.

Entered as second class matter May 31, 1945 at the Post Office at Ithaca, N. Y., under the act of March 3, 1879.

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INDICATED PRODUCTION OF EGGS IN SPECIFIED COUNTRIES, 1955

The production of eggs in 1955 in a group of countries of which estimates are available is indicated at approximately 129 billion, which would be about the same as a year earlier.

Most of the countries, compared with 1954, held their own, with slight increases in the United States and the Netherlands. The other European countries indicated 1955 production is expected to be about the same or slightly larger than in 1954.

Egg production in North American countries in 1955 is expected to be slightly greater than that of a year earlier with a 1-percent increase in the United States, and a 1-percent decrease in Canada. The number of layers on farms at the beginning of 1955 remained at a high level in both countries.

The Mexican Government continues to promote the expansion of its poultry industry. During the middle of 1954 it established a poultry center at the Palo Alto Research Center located near Mexico City. The Center is now distributing 100,000 chickens per month, from a day to four or five months old. Day-old chicks are sold throughout the country at a price of 4 cents, which is below the cost of production. Chickens over four months are sold at from 16 to 24 U.S. cents. Sales are made in lots of 50 to 100 chickens per person for the establishment of the "gallinero familiar" or family flock. This program is directed principally toward an increase in egg production in order to reduce the need for imports. The breeds used thus far have been Leghorn and New Hampshire.

Egg production in the reporting countries of *Europe* is expected to be the same as in 1954. The Netherlands and Denmark are the major egg-exporting countries of the world. Since the discontinuance of the Danish-British long-term agreement for eggs as of October 1, 1954, which meant the introduction of free trade in eggs between the 2 countries, prices paid Danish egg producers have been fluctuating a great deal. This has lead to more uncertainty in egg prices and Danish egg producers have expressed their aversion to such a development, although they do not disagree with free trade in principle.

It is recognized that greater fluctuations in prices may lead to more abrupt changes in production and may tend to turn some farmers away from egg production. At present,

however, no great changes are expected in Danish egg production during the second half of 1955. Eggs should be available for export during the second half of 1955 in about the same volume as during the same period of 1954. The table below compares the first half of 1954 with the first half of 1955.

	1954	1955
	Thousand Tons	
January	15.5	16.8
February	13.8	13.6
March	13.9	13.0
April	13.9	13.8
May	14.2	14.2
June	11.8	12.3
Total	83.1	83.7

Source: Statistical Department.

The output of eggs during the first half of 1955 was about 1 percent larger than during the comparable period of 1954. Production, as usual, reached its peak during January, declined gradually during February and March, and increased again slightly in April and May. However, the decline in egg production during February and March this year was markedly greater than normal because of the heavy slaughter of laying hens following the drop in egg prices at the end of January.

Egg production in South America and in the Caribbean area is expected to approximate 1954. Many of the governments, or their poultry associations, are promoting their poultry industries—primarily by aiding farmers in the purchase of United States laying stock. At present the majority of eggs produced in South America and the Caribbean are produced on small farms from domestic breeds. There is little fluctuation in egg production from year to year. Production per bird is exceedingly low, ranging from 60 to 90 eggs per year; and eggs are small, and generally of poor quality by the time they reach market. Nevertheless, these eggs find a ready market.

Producers have been unable to obtain any more for good quality eggs than for those of poor quality. This fact has tended to slow the increase of commercial egg production. Although most of the governments of South America and the Caribbean have been making plans recently to encour-

EGGS

Number produced[1] in specified countries, averages 1934-38, 1946-50; annual 1951-1954, indicated 1955

Continent and Country	Average 1934-38	Average 1946-50	1951	1952	1953	1954	Indicated 1955
	Million	Million	Million	Million	Million	Million	Million
North America							
Canada—Farm	2,638	4,015	3,611	3,984	4,086	4,420	4,400
Total	2,863	4,382	3,954	4,104	4,200	4,547	4,550
United States—Farm	35,498	56,535	59,265	60,985	61,704	65,375	66,000
Panama	——	[2]53	55	——	57	58	59
Mexico	——	——	——	——	2,080	2,400	2,400
Europe							
Austria	663	369	640	785	845	845	850
Belgium	1,693	1,584	1,945	2,030	2,175	2,325	2,330
Denmark	1,979	1,447	1,962	1,968	2,155	2,357	2,400
France	6,200	6,580	7,500	7,000	7,300	7,200	7,200
Germany, Western	3,700	2,655	5,000	5,300	5,500	6,065	6,150
Greece	550	388	440	490	525	550	550
Ireland	1,086	893	951	972	980	840	840
Italy	5,500	4,380	5,500	5,550	5,600	5,850	5,800
Netherlands	1,978	1,189	2,075	2,570	3,000	3,750	4,200
Norway	369	283	391	392	420	437	440
Sweden	1,000	1,288	1,390	1,370	1,375	1,380	1,400
Switzerland	423	486	529	518	520	536	530
United Kingdom:							
Farm[3]	[2]3,871	2,880	4,800	4,700	4,600	4,650	4,600
Total[3]	[2]5,098	4,590	6,500	6,300	6,200	6,250	6,200
Asia							
Turkey	1,003	859	942	980	——	1,000	1,000
Japan	3,553	970	3,873	4,676	5,140	5,340	5,350
Philippine Republic	[4]738	567	845	950	1,015	1,050	1,050
South America							
Argentina	1,127	——	3,000	3,000	3,150	3,500	3,500
Uruguay	289	323	——	——	330	320	320
Brazil	——	——	3,330	3,730	3,800	4,380	4,400
Africa							
Egypt	751	[5]694	455	520	525	530	540
Union of S. Africa[6]	——	——	960	955	970	900	900
Oceania							
Australia[7]	708	1,418	1,288	1,230	1,230	1,200	1,100
New Zealand	430	[8]146	[8]180	[8]185	[8]190	[8]190	[8]190

[1] Relates to farm production in the United States but many countries not explicit on this point. [2] Three-year average. [3] Years ending May. [4] 1938. [5] For 1947. [6] Years ending June. [7] Commercial production for years ending June 30. [8] Receipts at Marketing Department Stations, year ending March, which account for 30-40 percent of total production.

age commercial egg production, it will undoubtedly take considerable time for these programs to become effective. These areas should continue for some time to be good markets for shell eggs.

(This is one of a series of regularly scheduled reports on world agricultural production approved by the Foreign Agricultural Service Committee on Foreign Crops and Livestock Statistics. It is based in part upon reports of Agricultural Attaches and other U.S. representatives abroad. Foreign Agriculture Circular FPE 14-55, September 27, 1955. United States Department of Agriculture, Foreign Agricultural Service, Washington, D.C.)

IMPROVING POULTRY PRODUCTION IN THE PHILIPPINES

F. M. FRONDA AND AMADO C. CAMPOS

Department of Animal Husbandry, College of Agriculture
University of the Philippines, College, Laguna, Philippines

All major researches in any poultry improvement program may be grouped under three divisions; namely, breeding, feeding, and management. The flocks must be efficient producers of eggs and meat, and to be able to produce profitably, they must be given sufficient feeds of good quality and they must be managed properly. In its research studies the University of the Philippines, College of Agriculture hopes to achieve results that will do the most good to the majority of the country's poultry raisers—the dirt farmers. After all, the bulk of the eggs and poultry supply of the country for many more years to come will be derived from the flocks that are raised by these farmers.

The search for the right stock of fowls suited to the Philippine farm is one of the projects that has grown with the U.P. College of Agriculture. As early as 1912, it was recognized that the Philippine chicken, though hardy and relatively resistant to common poultry diseases, are poor producers of small-sized eggs. Attempts, therefore, were made before the war to acclimatize imported breeds with the hope of finding high-producing strains that would thrive well on the Philippine farm. Except the Cantonese fowls, however, work along this line was a failure.

With the Cantonese, a systematic breeding program for its development was carried out. From 1916 until the outbreak of the second world war, inbreeding and strict selection were conducted on this breed so as to raise its egg production potentialities. The work had progressed far enough to produce a strain of Cantonese birds which were called the Los Banos Cantonese. In production performance, this strain was comparable with the imported standardbred breeds, and in adaptability to farm conditions, it was equal to the native chickens. The war, unfortunately, interrupted this work. All the Los Banos Cantonese birds of the College were lost. After the war, an attempt was made to recover the strain out of the few mongrelized Cantonese birds that had been borrowed from the homes neighboring the College. On account of the poor quality of these birds, however, no progress was achieved even with careful selection and breeding procedures.

After eight years of fruitless efforts to recover the lost strain, the College decided to give up the work temporarily, and shifted its attention towards the selection and development of lines of Single Comb White Leghorn and New Hampshire birds that would live and perform profitably in the Philippines. The College has started caging pullets with the aim of isolating superior, hardy individuals which may be bred and multiplied. Since breeding is a slow process, it will take a few more years to produce concrete results, but so far, the indications are that the objective can be reached. Together with what has already been described, work on the crossbreeding of Oriental and Occidental breeds with the aim of combining their good qualities in one fowl was started in 1946. The work has not yet progressed far enough to warrant a conclusive statement, but the results so far obtained appear to be encouraging.

In order to improve the egg production of the farmers' flocks of Philippine fowls with the least possible expense and with immediate favorable results, the farmers are being encouraged to mate their flocks with Single Comb White Leghorn roosters. In this way, the hardiness and adaptability to local conditions of the local fowls and the egg producing quality of the White Leghorn will be combined in the offspring. The rate of improvement of the common farm flock following this method is very strikingly illustrated by the results of an experiment that was conducted many years ago in the Kansas Agriculture Experiment Station.

Ever since the early days of this College, the need for improved poultry diets in this country has been considered of primary importance. Since then, the goal has been to formulate rations that are not only simple, cheap, easy to mix and practical to use on the farm, but are also efficient. Different feedstuffs available on the farms and combinations of these feedstuffs have been tried. A grain and mash laying ration has been developed which consists mostly of farm products and by-products. This ration,[1] which was developed through the use of a little science and plenty of common sense, has become popular with backyard poultry raisers and farmers in the country.

[1]This ration is composed of the following ingredients:

Grain: Either rice or corn or both
Mash: Rice bran 40
Copra meal 30
Ground corn 10
Fish meal or shrimp meal 20
Shells and green grass—*ad libitum.*

When the use of battery laying cages began to attract the attention of Philippine poultry raisers years before World War II, we embarked on a search for a suitable all-mash ration for caged layers. Of the ten mixtures that were tested, the following mixture, all parts by weight, proved to be the most profitable:

Ground corn	50
Rice bran	20
Copra meal	10
Fish meal or shrimp meal	20
Ground shells	2%
Green feed	hand-fed every two days
Cod-liver oil	2%

This ration, minus cod-liver oil, is also highly profitable for layers kept in the pens. At present, this is the ration that is being exclusively fed to the flocks of this College. Given this ration, a flock of Single Comb White Leghorn pullets produced in 50 weeks an average of 194 eggs each, and it needed only 1.89 kilograms of feed to produce a dozen of these eggs.

The biggest feeding problem in this country, however, is the unsteady supply of cheap animal protein supplements. Fish meal, the animal protein ingredient that has gained wide use, is imported, and very often it is not available in the local market. The same is true with meat meal and other animal products used in poultry rations. By way of finding substitute feeds, the College tried fresh-water shrimps, which proved to be better than fish meal as a protein supplement. The supply, however, was not steady; furthermore, immediately after the war, this feed was more expensive than the imported fish meal.

In order to solve this fundamental problem, proteins from plant sources were tried, either as partial or total substitutes for proteins of animal origin. Copra meal, treated in various ways and incorporated at various levels in the ration, was tested in a number of feeding experiments. Studies were also made using mungo meal, germinated mungo meal, cowpea meal, ipil-ipil seed meal, soybean meal, and soybean oil meal. So far, the results show that, except for soybean oil meal, none of these plant products can totally replace the animal protein constituent of poultry rations. For growing chicks, soybean oil meal, in combination with corn meal and Aurofac, was observed to surpass even fish-meal in growth-promoting property.

While emphasis is being given to feeding problems, the management aspect of poultry production has not been over-

looked. Studies on the artificial as well as on the natural incubation of eggs and brooding of chicks have been made. At present, studies to determine the best type of laying houses for the farm are on the way. The first-year results indicate that simple laying houses constructed with materials available on the Philippine farms are as good if not better than the expensively constructed laying houses that are now seen on some farms in this country. In a study recently terminated in this College, the laying house with all sides open, except for a little protection on the perches against strong winds, proved to be the best. This type of laying house is not only cheap but can also be constructed easily by the farmer.

In a nutshell, the poultry production studies that have been made and that are still being pursued in the College are calculated to produce results that will be of direct benefit to the rural population of the country. Improved poultry production in the rural areas will benefit these areas by making more eggs and meat available for food; any excess may be sold for the purchase of other things that the farmers may need in their homes. The farmers will be encouraged to raise more poultry and they will be provided with a paying hobby.

MARKETING EGGS IN ALASKA

Retailers and wholesalers in Alaska, buying and selling eggs, use an egg quality identification all their own. They advertise and trade "Airborne," "Express," "Boat," "Canadian," and "Local" eggs. These quality terms were the natural result of merchandising efforts by the egg trade to get away from the spoiled and off-flavor eggs that were the rule rather than the exception in Alaska years ago. Consumers were in the habit of associating egg quality with the mode of transportation available at that time.

Today, air-freight service, truck service via Alcan Highway, and steamship service provide new and improved methods of transportation plus modern storage facilities. But the habit of associating egg quality with transportation still prevails in Alaska.

Egg quality at the consumer level has improved considerably with the changes in transportation and storage facilities. But too frequently very poor quality and loss eggs are found in the egg cartons with better quality eggs.

"Airborne" eggs generally originate from Washington and Oregon. They are flown from Seattle to Anchorage in

approximately 6 to 8 hours. Normally, these eggs are shipped in new fiber cases containing 15 or 30 one-dozen cartons at freight rates of 14 to 17 cents a pound. Airlines provide a refrigerated holding room at the airport. Delivery truck service is also available at the airport. These eggs were retailing for about 94 cents a dozen in July of this year.

"Express" eggs are loaded in Seattle into trailers equipped with refrigerating units. The trailers are taken to the docks and hoisted aboard a barge that can haul a double-decked load of about 30 trailers. Electricity furnished by the barge powers the trailer-refrigeration units. These eggs are maintained at 36°F. enroute to destination—the trip from Seattle to Seward takes about 7 days. Upon arrival the trailer bodies are unloaded onto trailer-tractor units and hauled to their final destination. This method speeds up delivery time. It also eliminates 4 to 5 case handlings normally involved in boat shipments. The freight cost, including transshipping from Seward to Anchorage, is about 4 cents a pound. These eggs were retailing for about 77 cents.

"Boat" eggs are shipped by steamship in ventilated holds. The sea water against the ship's exterior and the air supply the only refrigeration. At Seward the eggs are transported by truck or uniced refrigerator cars. The freight rate from Seattle to Seward is about the same by steamship as by express. But transshipment from Seward 470 miles to Fairbanks adds 1½ cents per pound. These eggs were selling for 77 cents a dozen.

"Canadian" eggs enter Alaska in refrigerated trucks via Alcan Highway and by boat from British Columbia. These eggs sold for 73 cents a dozen on a 4th of July sale.

"Truck" eggs are eggs shipped by refrigerator trucks from the North Central States via Alcan Highway. They retail for about the same price as Canadian eggs.

"Local" eggs are produced on farms adjoining the Fairbanks, Palmer, Anchorage, and Junea areas and sold directly to retailers. They sell for about $1.20 to $1.25 a dozen.

LOCAL EGG PRODUCTION

In recent years, egg production has increased in Alaska. But few producers depend entirely on their flocks as their sole source of income. The main source of local egg production comes from regularly housed laying flocks of 50 to 5,000 birds. The average size flock is about 150 to 200 birds.

Most of the poultry feed is shipped in from the States and costs about $45 more per ton than in the United States.

The high feed cost, resulting from freight rate charges, accounts for the high price of local eggs.

MARKETING FACILITIES

Alaska, unlike the large egg-distributing areas of the U.S., lacks facilities for grading and packing eggs. Most eggs shipped into Alaska are already graded and packed. The little packing and grading done locally is confined to a number of large producers and a small but active marketing cooperative in the Matanuska Valley.

Eggs are generally displayed very effectively in modern refrigerated display cases in self-service supermarkets. These stores, patterned after similar markets in the States, are even present in the smaller towns.

Providing holding space for backlog stock is one of the big problems. Eggs are generally held at from 60° to 80° F. during the summer months in nonrefrigerated storage for 1 to 3 weeks, or more, in the back of the store or in the basement. A large backlog of eggs is usually maintained to guard against any shortage due to shipping interruptions in the States. Where refrigerated storage is available for backlog supplies, eggs are frequently stored with fruits and vegetables. In these circumstances, eggs acquire off-flavors.

Proper stock rotation is another problem in Alaska. In some cases, if a "good" buy shows up in a new purchase this supply is "pushed" while older stock is kept in storage. This practice caused at least one lot of relatively high priced local eggs to set around for 3 weeks at unrefrigerated temperatures while low-priced eggs, which were offered as "leaders," were held under refrigeration in ideal sales location.

EGG QUALITY

Most egg shipments are marked AA large or AA extra large. These eggs originate in Washington and are shipped by air or sea. Shipments from Canada and Minnesota are marked A large and shipped by truck. Local eggs are marked either large or grade A large.

The best quality eggs were found in the few shell-treated (a colorless, tasteless mineral oil applied to the shell that aids retention of quality) airborne lots from Washington and in several local untreated lots. If stains were ignored on local eggs, they would have been of excellent quality. (Marketing Activities, Vol. 18, No. 10. October 1955. Agricultural Marketing Service, United States Department of Agriculture, Washington, D.C.)

NEWCASTLE DISEASE—AN EXPERIMENT WITH A DUST VACCINE*

F. H. MANLEY**
Department of Bacteriology, Alabama Polytechnic Institute Auburn, Ala., U.S.A.

The results of mass vaccination against Newcastle disease and infectious bronchitis with live dust vaccine have been reported by Markham *et al.*[1] and Price *et al.*[2] Both reports, which emanate from Lederle Laboratories, Pearl River, New York, indicate that a satisfactory degree of immunity is obtained following the use of micronized dust vaccines and that the method is practical and safe.

MATERIALS AND METHODS

The limited experiment here described was designed in part as a demonstration to veterinary students, who carried out some of the work under supervision of the author.

The Newcastle dust vaccine and the antigen were supplied by Lederle Laboratories Division, New York.

The vaccination was carried out on one house of 3,000 broilers which were White Rocks of the Arbor Acres strain.

The dust vaccine was applied with an ordinary garden dust applicator when the chicks were five days old. The applicator was held about two feet above the chicks and the dust applied as uniformly as possible. Infra-red brooder lamps were being used which possibly facilitated the procedure. The vaccination was completed in a few minutes.

Serum was taken just prior to vaccination and at varying times thereafter. The antigen was checked against a known positive serum.

The method of carrying out the hemagglutination inhibition (H.I.) tests was that of the Bureau of Animal Industry (USDA, BAI, 1946) except that an indented plastic plate was used in place of agglutination tubes. This plate does not necessitate the use of a mirror or a lamp.

The parental history of the chicks in regard to vaccination was not known.

RESULTS OF TESTS

The virus titer was found to be 1 in 1280. This remained constant throughout the eight weeks of the test. The antigen was stored in a refrigerator between tests.

Hemagglutination inhibition tests were carried out just prior to vaccination and at 13, 26, 36, 45, 51, and 55 days

* Approved by the Committee on Publications, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala.
** Veterinary Bacteriologist, The Research Foundation of State University of New York, U.S. Operations Mission to Israel.

following vaccination. Apart from the final test only a minimum number of sera were tested. Prior to vaccination pooled serum from three chicks was found to be negative to the H.I. test. Subsequent to vaccination serum from two chicks was included in the first, second, and third tests and serum from one chick in the fourth and fifth tests. The final test included serum from nine birds pooled in groups of three. The computed inhibiting power of all sera tested subsequent to vaccination was found to be 640 except for one of the groups included in the last test which was considered to be between 320 and 640. It is of some interest to note that except for the last nine birds those tested were in the nature of culls and in comparatively very poor condition.

CLINICAL EFFECT OF VACCINATION

The clinical reaction following vaccination was quite noticeable. However the mortality which might be attributed to the vaccination reaction was negligible. None of the birds developed nervous symptoms. Previous experience on the same farm with vaccine administered intraocularly or intranasally at one day of age resulted in very severe reaction, slight mortality, and with a very few birds developing nervous symptoms. The average weight of the birds at 58 days was 2.77 pounds with a conversion of 2.45 pounds of feed per pound of meat.

REACTION IN MAN

Five people, including the author, were present in the shed when the vaccine was administered and could be considered exposed to the dust. At the time the chicks reacted the author developed a moderately severe conjunctivitis. Thirteen days after exposure the author's serum was completely negative to the H.I. test. This was the same day the first positive test was run on the chicks.

SUMMARY AND CONCLUSIONS

Although only very few sera were included in this experiment, it would appear that satisfactory H.I. titers were maintained in this flock from the thirteenth to the fifty-fifth day following vaccination. These times were the limits of the experiment. Although some of the birds tested were in very poor condition, this did not seem to interfere with the development of fairly high H.I. titers.

The clinical reactions were less severe in this test than those previously encountered when intraocular or intranasal vaccination was carried out on day old chicks. The rate of growth and food conversion percentage were good.

A case of human conjunctivitis occurred during the experiment which was apparently purely coincidental or due to mechanical irritation, if the H.I. reaction is considered an indication of infection.

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TRACERS TELL ON THE CHICKEN

Atomic energy is helping to reveal basic biological processes by which poultry hatchability, growth, feed efficiency, and egg production may be improved. USDA poultry nutritionists at Beltsville, Md., are seeking these improvements by radio-activation of some diet compounds.

The tracers show the course of these materials through tissues of eggs or chickens, as well as changes in metabolism not readily measured by other means. Also, the method permits use of test materials in minute quantities, thus precluding possible upset of normal physiological activities in eggs or chickens.

Tracer studies have shown that sulfate sulfur (present in many feed ingredients, is of definite value to chickens—not merely an excretory product as long believed. Subsequent feeding trials show sulfate can partly replace the amino acids cystine and methionine, often deficient in diets of farm animals and man.

Biochemical transformations within the egg have been studied by this means. Included are conversion of methionine to cystine and some of it to taurine (a substance found in animal tissue) or sulfate. The sulfate produced is believed necessary for the formation of cartilage.

Methionine thus traced may help develop a new way to estimate amino-acid (protein) requirements of layers. Scientists found more rapid deposit of radioactive sulfur from methionine in hens on a low-protein diet than in those on a normal diet.

Tracer studies also showed that chickens up to 6 weeks old depend largely on the egg supply of growth-promoting vitamin B_{12}. Later, they manufacture a part of their requirements of this important vitamin.—(Agricultural Research, October 1955, Vol. 4, No. 4: 13, United States Department of Agriculture, Washington, D.C.)

A POULTRY IMPROVEMENT PLAN FOR AUSTRALIA

F. SKALLER
C.S.I.R.O. Poultry Research Center, Werribee, Victoria

Suggestions made in November 1954 at a Poultry Efficiency Conference of Commonwealth and State Poultry Officers have been approved by the Australian Council of Agriculture, and a detailed Flock Improvement Plan has been worked out and agreed upon by poultry officers at a conference held in Melbourne during August 1955.

The Poultry Flock Improvement Plan will be implemented and administered by the State Departments of Agriculture of the six Australian States, but will be based uniformly on the following approved principles:

There will be three grades of accreditation, viz. "Approved Breeding Farms," "Approved Multiplication Farms," and "Approved Hatcheries." *Approved Breeding Farms* musts have at least 700 adult female birds for each recognized breed kept (S.C. White Leghorn, Australorp, Rhode Island Red, and one more breed determined by the State), they must apply genetically sound principles of breeding, and they are compelled to have samples of their flock tested at the State Random Sample Tests, where these samples must reach a fixed minimum level of egg production over a period of years. These minimum levels will be fixed by the States and gradually raised. Samples will be taken by State Officials in a random fashion and must consist of 160 hatching eggs if less than 40 males of one breed are used for matings, otherwise larger samples will be required.

Approved Multiplication farms must use for all matings males obtained from approved breeding farms only. *Approved Hatcheries* must incubate only eggs produced by either approved breeding or multiplication farms.

It has been estimated that less than 20 approved breeding farms could supply all the males for the fertilization of the eggs necessary to produce about 10 million of pullet chickens which are probably required annually by the Australian commercial egg producers for replacement purposes.

Two States (New South Wales and South Australia) have Random Sample Tests established since some years, the other States have plans in hand to erect suitable facilities for random sample testing.

As a further step to raise the efficiency of the Australian poultry industry the State's poultry extension service will be improved by providing better training in Poultry Science on

the graduate level. Post-graduate courses of 3 months' duration will be instituted at Melbourne University in collaboration with the research staff of the Commonwealth (C.S.I.R.O.) Poultry Research Center and the poultry section of Victoria's State Animal Husbandry Research Center, both located at Werribee near Melbourne. Plans are now in hand to commence the first course late in 1956 or early in 1957. Foreign students with graduate qualifications will probably be admitted.

DEVELOPMENT OF POULTRY IN INDIA

The Union Ministry of Food and Agriculture has prepared a Scheme of Poultry Development for inclusion in the Second Five-Year Plan.

Before launching the main Scheme, the Ministry proposes to take up preparatory work on a pilot scale at fifty selected centres, one each in Assam, Bihar, Hyderabad, Madyabharat, Madhya Pradesh, Madras, Mysore, Orissa, Punjab, Travancore-Cochin and West Bengal, and two each in Bombay and U.P.

Under the pilot and main scheme, it is proposed to import baby chicks from abroad after taking necessary precautions to prevent introduction of transmissible diseases, rear them in Government Farms up to the age of five months and distribute them in the country through Development Blocks in a systematic manner. These blocks will be located in areas suitable for poultry work preferably in the Community Project and National Extension areas.

Three hundred birds (200 females and 100 male) will be distributed in each block at the rate of two females and one male per breeder at a concessional rate of Rs2/- per bird. One thousand hatching eggs will also be distributed in these and other villages at a concessional price of 2½ annas per egg. The U.S. Technical Co-operation Mission will provide an expert to assist the Government in the execution of the plans and arrange free supply of baby chicks from abroad.

On maturity, the birds will be sold to the villagers at concessional rates and steps will be taken to ensure that at least in the development blocks no cocks other than imported ones are left. These steps will help in improving the breed of the birds and ensuring better production in future.

Poultry Extension Centres

For the guidance of the breeders in general, a poultry extension centre will be attached to each development block for demonstrating scientific methods of breeding, feeding and management of poultry to the villagers. These centres will function as demonstration farms with 100 birds supplied by the Government farm and will eventually distribute hatching eggs to the villagers both in the blocks and in the surrounding villages. Further, five persons from each block will be selected and trained in poultry farming for 1½ months on a stipend of Rs.20/- per mensem each. While they will be utilizing their own knowledge in running their business, they will form the second line of assistance and guidance to the villagers. Twenty persons will also be selected in a town and 10 birds given to each at the rate of Rs.5/- per bird.

The pilot project is expected to cost Rs.10 lakhs. Intended to take up all aspects, such as demonstration, supply of birds and eggs, training of personnel and marketing, it will, on April 1, 1956, merge into the main Scheme, which will operate 300 centres.

(S. G. Iyer)

POULTRY IMPROVEMENT IN IRAN

Four years ago it was estimated that the chickens of Iran produced less than one egg a week for each Iranian. The picture has changed greatly during the past few years since the activities of the United States Operations Mission to Iran (Point Four) under the direction of Dr. E. R. Halbrook, poultry specialist from Montana State College.

With the help from individuals and from such American organizations as Heifer Project, Inc., American 4-H Clubs, Sunday school children and others, 165,000 baby chicks have been sent from America in the past four years. At the same time the Iranians have been helped to make great steps in improvement of livestock.

Four years ago Iranian poultry stock was nondescript and almost completely lacking in any breed characteristics. The hens resembled the bantam chickens that American boys liked to obtain as pets. An Iranian hen produced 50 to 80 eggs a year and those very small. They provided less than half the meat of an average American chicken.

Late in 1951 importation of baby chicks from the United States was begun. By the middle of 1952 more than 75,000 baby chicks had been imported and thousands of young roosters were exchanged with farmers for Iranian chickens in an attempt to improve the native breed. In 1953 Heifer Project contributed 30,000 chicks to be flown to Iran. Four American childrens' groups decided to give 30,000 more chicks an airplane ride half way around the world to aid Iranian farmers and Iranian 4-H boys and girls in improving poultry in this far-away country of Persia. These chicks traveled on one of the world's fastest airlines in pressurized, temperature-controlled compartments. Newly arrived chicks were transported at once from the airport to specially prepared quarters and fed and watered immediately.

A large number of the 1952 chicks were used to establish Livestock Bureau station flocks as well as flocks at the Karadj Agricultural College and Near East Foundation. Next, demonstration purebred flocks were established to show the Iranian farmer recommended poultry practices. The primary objective in distributing these chicks has been to establish pure bred foundation breeding flocks from which chicks and hatching eggs can be secured in the future. The flock owners are being given technical assistance in housing, feeding, management and disease control. It is estimated that there now are about two million purebred American chickens in Iran and possibly 20,000,000 cross breed chickens. Since the cross breeds produce an average of more than twice as many eggs a year of a better quality and size, and at least half again as much meat, it can safely be said that poultry income, if home consumption is included, has been doubled in Iran from the time Point Four assistance arrived.

All chickens and hatching eggs imported from America were turned over to the Government of Iran, to the Livestock Bongah (Bureau), the official government agency for handling livestock improvement in Iran, but all distribution and management has been handled in cooperation with Point Four technicians.

The poultry section of the Agriculture Division has encouraged the establishment of small hatcheries. In addition to the many thousands of baby chicks flown to Iran, 75,000 hatching eggs have been imported. Now small incubator manufacturers are coming into business and stimulus is being given to artificial incubation.

In the huge capital city of Tehran the daily sight of the huckster is a familiar one. His tiny donkey will be loaded with

vegetables or he will carry all kinds of fruits on his head. Eggs are usually peddled from door to door with the vendor calling "toqmemorq", or in shops along the streets. There is no organized marketing of eggs and poultry nor uniform grading of these products. The pedler selling "juje" (chickens) carries them down the streets, a half dozen or so in each hand. And chicken coops along the main thoroughfares are a common sight.

Just as in the United States and most other countries poultry and eggs represent an important source of food for the tables of both town and farm families, and are a source of cash income for farm or village wives to assist them in buying other needed items of food and clothing.

The objective of Point Four's poultry improvement program in Iran is to increase both number and quality of chickens and eggs produced and to make poultry raising more profitable through reduction of losses and through increased production. This program has operated and expanded in 1954 and 1955 without the need for additional imported chicks.

WANTED

Inquiries for the proceedings of the following World's Poultry Congress have been received:

Holland—1921

Spain—1924

Italy—1933

France—1951

Scotland—1954

Most of these requests come from libraries. If any person has any of these Proceedings and would care to dispose of them please notify Dr. G. F. Heuser, Rice Hall, Ithaca, N. Y., U.S.A.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne

1365 Iris St., N.W.

Washington 12, D.C., U.S.A.

GENETICS

ALLEN, C. J. (Michigan State Coll., East Lansing.)
COMPETITIVE FERTILIZATION IN *GALLUS DOMESTICUS*. *Diss. Abstr., 14:* 859. Title in *Biol. Abstr.*, 1955, *29* A, No. 24. (Animal Breeding Abstracts)

BERG, R. W. and SHOFFNER, R. N. (Univ. Minnesota, St. Paul.)
THE RELATIONSHIP BETWEEN 24 WEEK BODY MEASUREMENTS AND REPRODUCTIVE PERFORMANCE. *Poultry Sci.*, 1954, *33*, 1043. *Proc.* (Nutrition Abstracts and Reviews)

COCK, A. G. (U. Cambridge, Eng.)
A NOTE ON J. S. S. BLYTH'S MOSAIC HEN. *Poultry Sci. 33:* 1034-1036. 1954.—In a half-and-half mosaic hen *(Gallus domesticus)* described by Blyth, one side of the body was assumed to have developed from an unfertilized polar body. It is shown that better agreement with the facts is obtained by assuming that the polar body was fertilized by a second sperm.—*A. G. Cock.* (Biological Abstracts)

COLEMAN, T. H., and R. GEORGE JAAP. (Ohio State U., Columbus.)
THE TOPCROSS PROGENY TESTS OF SIRES USED FOR INBREEDING IN POULTRY. *Poultry Sci. 33:* 958-965. Illus. 1954.—Prospective epistatic white sires used for further inbreeding were selected on a basis of the growth rate of their cross progeny from random samples of 11-18 New Hampshire females. The cross progeny of 1 sire (this sire was included in all tests) was used to measure the changes produced with each generation of inbreeding. In 2 generations of selection while increasing the coefficient of inbreeding from 25 to 50%, a gain in weight of 0.11 lb. at 6 weeks, 0.23 lb. at 9 weeks, and 0.22 lb. at 12 weeks was obtained in the topcross progeny. When the standard deviation for each of 80 different groups was plotted against body weight at each of 6, 9 and 12 weeks of age, the standard deviation did not increase with increasing weight of the progeny at each specific age. This gave validity to use of the actual deviation for each test in spite of the wide differences in progeny growth rates between tests. Use of the coefficient of variation as a measure of variability in chickens at the same age is questioned. Some evidence was obtained that 11 females are not sufficient to prevent the random selection of an occasional distinctly superior, or inferior, sample of the inheritance for growth rate in a non-inbred population.—Auth. summ. (Biological Abstracts)

GLAZENER, E. W. and W. L. BLOW. (N. Carolina Agric. Expt. Sta., Raleigh.)
VARIATIONS IN HYBRIDS FOR EFFICIENCY OF EGG PRODUCTION. *Poultry Sci.*, 1954, *33*, 1055. *Proc.* (Nutrition Abstracts and Reviews)

HAYS, F. A. 1954.
INHERITANCE OF VIABILITY OF PULLETS IN THE LAYING HOUSE. *Poult. Sci., 33:* 1107-1108.—The mortality rate of families of sisters bred for high fecundity in a closed R.I.R. flock was studied from 1942 to 1951. Since yearly mortality fluctuated widely, only data for 4 similar yrs. were used. The mean mortality rates in 1942, 1947, 1948 and 1950 were 22.12, 26.17, 21.13 and 25.24% resp. Heritability of viability in families with 10 or more sisters was found to be 2.88%. Viability in the 1st laying year was found to be highly variable and subject to many factors. (Animal Breeding Abstracts)

HAYS, F. A. 1954. (Massachusetts Agric. Exp. Sta., Amherst.)
TESTING FOR OVER-DOMINANCE AND EPISTASIS. *Poult. Sci., 33:* 1105-1106.—At the Massachusetts Agricultural Experiment Station the R.I.R. flock, which has been closed and pedigree-bred for over 20 yrs. with increased fecundity and high viability the aim, has not shown a satisfactory increase in the rate of egg production in the last few years. Average 1st yr. production for the last 5 yrs. has been about 235 with no significant year to year fluctuations. Inbreeding in the flock has always been kept under 5%. As over-dominance, epistasis or decreased genetic variability might be involved, a study was made of birds hatched in 9 generations from 1943 to 1951. The method of interpreting the data from the egg records of 948 daughters of 31 ♂♂ mated to 121 dams is described, and an egg production heritability of 0.1808 is calculated.

Although genetic variability was somewhat reduced in high producing families, and there may have been unfavorable environmental effects, the failure of the flock to improve its egg production rate has not yet been satisfactorily explained. (Animal Breeding Abstracts)

JUHN, M. 1954. (Maryland Agric. Exp. Sta., College Park.)
ON THE TWO-FOLD SOURCE OF PATTERN IN PLUMAGE IN THE FOWL, WITH EXAMPLES FROM THE HYBRID. *J. Exp. Zool.*, 126: 473-495.—A study was made of the breast and saddle feathers of F_1 crossbred ♂♂ aged 5½ mths. in order to ascertain the extent to which feather color pattern in the fowl is determined by the developmental properties of the regenerating feather rather than by the melanophores. The crosses used were: Barred Plymouth Rock×Brown Leghorn (reciprocal), B.P.R.×New Hampshire (reciprocal), B.L.×N.H. (reciprocal), and B.L. ♂×Columbian ♀. The observations are presented separately for each cross. The distinctive configuration of the hybrid barring was modified by addition of thiouracil to the diet. (Animal Breeding Abstracts)

KUSNER, H. F., and S. V. KAMENEVA. 1954. (Inst. Genet., Acad. Sci. U.S.S.R.)
EKSPERIMENTALJNYE DANNYE O RASSATYVANII NASLEDSTVENNOSTI U ZIVOTNYH PRI INBRIDINGE. [EXPERIMENTAL DATA ON THE INSTABILITY OF INHERITED CHARACTERS IN ANIMALS THROUGH INBREEDING.] *Z. obsc. Biol., 15:* 428-438.—In 1950 close inbreeding was begun in part of a flock of White Leghorns at the Institute of Genetics. The first 4 inbred generations were compared with the non-inbred controls. At 3 and 5 mths. the live weight and body measurements of the inbreds were less, and variation was greater than in the controls; blood indices were lower. Egg production and weight decreased progressively in each inbred generation. Hatchability of eggs of inbred hens averaged 47.6% of the fertile eggs set *v.* 75% for the controls; mortality to 3 mths. averaged 53.8 and 8.7% resp. The plumage of several 2nd generation inbred hens was slightly pigmented; a larger percentage of 4th generation inbred birds had pigmented plumage; the abnormal feathers were grey, pale yellow or smoky. Ten out of 28 fourth generation birds were affected; of 14 pure white 4th generation hens mated with white closely-related cocks 6 produced chicks with pigmented plumage. (Animal Breeding Abstracts)

MEIRELLES DE MIRANDA, R. 1954. (Inst. Zootec., Rio de Janeiro.) (English summary)

HERITABILIDADE DA PRODUCAO DE OVOS. [HERITABILITY OF EGG PRODUCTION.] *Rev. Prod. Anim. 1:* 53-59.—Estimates of the heritability of egg production were made in 4 consecutive years (1947-50) from a White Leghorn flock of 498-1074 birds; the estimates were 22.38, 32.54, 39.94 and 26.46% resp. (Animal Breeding Abstracts)

ROSENBERG, M. M., J. E. ALICATA, and A. L. PALAFOX. (U. Hawaii, Honolulu.)

FURTHER EVIDENCE OF HEREDITARY RESISTANCE AND SUSCEPTIBILITY TO CECAL COCCIDIOSIS IN CHICKENS. *Poultry Sci. 33:* 972-980. 1954.—From an original mating of a single S.C. White Leghorn male and 14 S.C. White Leghorn females selected at random, it was possible to develop and establish 2 lines that differed significantly in resistance to the protozoan disease, *Eimeria tenella*. During the last 3 years of this investigation, the average difference in survivability of chicks from the 2 lines, artificially challenged with a controlled dose of sporulated oocysts, was 39.1, 40.4, and 43.1%. The comparative resistance of the susceptible lines was 50.9% that of the resistant line in the last generation. Based on percentage survivability, the following results were obtained from the last test: R x R, 87.8%; R x S, 69.7%; S x R, 63.4%; S x S, 44.7%; R x F_1 (R x S and S x R), 85.0%; S x F_1 (R x S and S x R), 52.6%; and F_2 from $(F_1)^2$, 62.8%. Under the conditions of the experiment, it appears that resistance and susceptibility to cecal coccidiosis are influenced by hereditary factors. The factor or factors for resistance or susceptibility do not exhibit a strong order of dominance. Furthermore, these data do not support the possible effect of sex-linkage, passive transfer of immunity, or cytoplasmic inheritance. The data obtained were in close agreement with previously published reports.—*A. L. Palafox.* (Biological Abstracts)

SAEKI, Y., ONISHI, N., and TAKETOMI, M. 1954. (Nat. Inst. Agric. Sci., Chiba-Shi.) (Japanese with English summary.)

THE INHERITANCE OF SHANK COLOR IN NAGOYAS AND WHITE SILKIES. *Jap. J. Zootech. Sci. 25:* 127-132.—From the results of experimental matings involving White Silky or Nagoya fowls and S.C. White Leghorns and Barred Plymouth Rocks it is concluded that the slaty shank in Nagoyas is determined by the sex-linked gene *id* (non-inhibitor of dermal lipochrome) and the autosomal gene *W* (inhibitor of epidermal lipochrome). The genotype of slaty-shanked Nagoyas is thought to be *OOCCeeiiWWb-id-* for ♀♀ and *OOCCeeiiWWbbidid* for ♂♂.

In White Silkies shank color is determined mainly by the *id* gene, but black shanks were unexpectedly found in F_1 ♂♂ from crosses between W.L.s and White Silkies and between B.P.R.s and White Silkies. As the inheritance of comb and beak color is sex-linked, the sex of hybrid chicks can be determined at hatching. (Animal Breeding Abstracts)

TAIBEL, A. M. 1954. (English summary.)

IL PIUMAGGIO "GRIGIO-ARDESIA-AZZURRASTRO" DELL'ANATRA MUSCHIATA *(Cairina moschata domestica* L.) E. SUO VALORE GENETICO. CREAZIONE DELLA VARIETA "GRIGIO-PERLA" PER MUTAZIONE. [THE "BLUISH SLATE-GREY" PLUMAGE OF THE MUSCOVY DUCK (*Cairina moschata domestica* L.) AND ITS GENETIC BASIS. THE CREATION OF THE "GREY PEARL" VARIETY BY MUTATION.] *Ann. Sper. Agr.*, N.S., *8:* 1795-1801.—Crosses between bluish slate-grey birds give offspring of 3 types, namely black, bluish slate-grey and grey pearl, in the proportion 1:2:1. The genotypic formula *PPNNBB* is postulated for black plumage (see preceding abstract), where *N*, with its allele *n*, are factors controlling pigment intensity. Bluish slate-grey and grey pearl birds would thus have the genetic constitutions *PPNnBB* and *PPnnBB* resp. (Animal Breeding Abstracts)

VAN ALBADA, M. (? 1954). (English summary.)
AANGEBOREN SNAVELFWIJKINGEN BIJ PLUIMVEE. [CONGENITAL BEAK DEFECTS IN POULTRY.] *Meded. Rijksinst. Pluimveeteelt [Beekbergen]*, No. 53: 15 pp.—A review. (Animal Breeding Abstracts)

WODZINOWSKI, J. 1954.
WYNIKI DOSWIADCZEN NAD UZYTKOWYM KRZYZOWANIEM KUR. [THE RESULTS OF CROSSBREEDING EXPERIMENTS WITH POULTRY.] *Przegl. hodowl., 22:* 51-53.—Investigations were begun at the experiment station of the Zootechnical Institute in Pawlowice in 1951 on egg fertility, hatchability, growth rate, egg yield, and egg size in reciprocal crosses between the Sussex and R.I.R., Sussex and Polish Greenleg, Sussex and Leghorn, and R.I.R. and Polish Greenleg. The results to date indicate that the percentages of fertility and hatchability are lower in inter-breed matings than in matings between birds of the same breed. Fertility was highest when the hen rather than the cock belonged to a breed with a high percentage of egg fertility. The crossbreds, however, showed smaller rearing losses and a higher growth rate than the purebred birds. The av. percentage reared to 10 wks. was over 94% in Greenleg×Sussex (reciprocal) crosses compared with only 76% for the parental breeds. At 8 wks. of age chicks from Greenleg hens mated to Sussex cocks weighed over 9% more than purebred Sussex chicks and about 11% more than Greenlegs. Young cockerels killed at 10 wks. and hens killed at the end of their first laying year were superior to birds of the pure breeds in percentage of edible meat. The Sussex ♂×Greenleg ♀ cross was particularly suitable for meat production, as it inherited the flesh-colored legs and skin of the Sussex and not the undesirable greenish legs and bluish skin of the Greenleg. In weight the crossbreds were intermediate between the parental breeds, but generally tended to be nearer the heavier breed.

The crossbreds were valuable mainly on account of their high egg production. As a rule they began to lay 2-3 wks. earlier than purebreds and produced more eggs during the autumn and winter months. The Sussex×Greenleg cross, for example, had a winter yield of 48 eggs per hen *v.* 29 for the Sussex and 27 for the Greenleg.

The av. egg yield of crosses between R.I.R. ♂♂ and Sussex ♀♀ during their first laying year was 26% higher than that of R.I.R.s and 35% higher than that of Sussex hens. The yield of birds from the reciprocal cross was 34% higher than that of the Sussex and 25.5% higher than that of the R.I.R. Crosses between Greenleg ♂♂ and Sussex ♀♀ yielded 44% more eggs than the Greenleg and 32% more than the Sussex. The reciprocal cross gave 24% more eggs than the Sussex and 40% more than the Greenleg. The av. weight of the eggs from crosses between R.I.R. ♂♂ and Sussex ♀♀ was 61.1 g. In some of the crosses (*e.g.* the Greenleg×Sussex and Greenleg×R.I.R.) it was possible to sex the chicks at hatching by their down and leg color. (Animal Breeding Abstracts)

PHYSIOLOGY

ALEJANDRINO, PEDRO L. (University of the Philippines, College of Agriculture, College, Laguna, Philippines).
THE INFLUENCE OF SEASON ON THE AMOUNT AND QUALITY OF SEMEN PRODUCED BY THE COLLEGE S.C. WHITE LEGHORN ROOSTERS. *Philippine Agriculturist 38:* 168-180. 1953.—It was observed that there was a definite annual rhythm of sperm production and efficiency similar to that observed in egg production. The late winter and early spring months seemed to be the time when the greatest volume, as well as concentration, of semen was produced. This was also the period when sperms were at the height of their fertilizing efficiency. Temperature had a stimulating effect on semen vol-

ume and concentration as well as on initial motility. Motility was found to be inversely related to fertilizing efficiency.—*F. M. Fronda.*

ASMUNDSON, V. S., and C. F. PUN. (U. California, Davis.) GROWTH OF BRONZE TURKEYS. *Poultry Sci. 33:* 981-986. 1954. —From weights of samples of several strains of Bronze turkeys, at 0, 2, 8, 16 and 24 weeks of age, percentage rates of growth between these ages were calculated. The various relationships between weights, between rates of growth, and between rates of growth and weights at different ages, reflect the tendency to compensate for differences in early percentage rate of growth by inverse changes in later percentage rates of growth. The data suggests that selection may be made effectively, for early rapid rate of growth at 8 weeks of age, for weight at 6 months as early as 16 weeks of age.—*V. S. Asmundson.* (Biological Abstracts)

AUXILIA, M. T. 1954. (1st. Zootec. Casear. Piemonte. Turin.) (English summary.) OVULAZIONE TERATOLOGICA IN UNA GALLINA DI RAZZA "PIEMONTESE COMUNE." [TERATOLOGICAL OVULATION IN A HEN OF THE PIEDMONT BREED.] *Ann. Sper. Agr.*, N.S., *8:* 993-1003. (B.)—Two double eggs, weighing 175 and 140 g. resp., were laid by a hen which continued to lay normal eggs (52-58 g.). Each outer egg contained, in addition to albumen and yolk, an inner egg complete with shell. The possible causes of the phenomenon are discussed. (Animal Breeding Abstracts)

BAGLEY, ROYAL A. (Utah State Agric. Coll., Logan.) TOXIC REACTION TO DIHYDROSTREPTOMYCIN IN YOUNG POULTS. *Poultry Sci. 33:* 1276-1278. Illus. 1954.—Poults treated with Bicillin S M (Wyeth) showed a toxic reaction 15 to 20 minutes following injection. Poults developed leg weakness, incoordination, prostration and became comatose. Tests showed dihydrostreptomycin to be the toxic principal. Poults less than 2-weeks old cannot tolerate much more than 25 mg of dihydrostreptomycin without some degree of toxic reaction. Chickens showed a toxic reaction but appeared to have a greater tolerance for dihydrostreptomycin than turkeys.—*R. A. Bagley.* (Biological Abstracts)

BALDINI, J. T., R. E. ROBERTS, and C. M. KIRKPATRICK. (Purdue U., Lafayette, Ind.) THE REPRODUCTIVE CAPACITY OF BOBWHITE QUAIL UNDER LIGHT STIMULATION. *Poultry Sci. 33:* 1282-1283. 1954.—Three bobwhite hens and one cock, selected at random from a group of chicks hatched June 5, 1950, were confined in an indoor cage and subjected to light from a 200 W. incandescent bulb starting October 7, 1950. A standard poultry laying mash was fed ad libitum. On November 24, at the age of 172 days, 1 hen came into production, and within 30 days all 3 hens appeared to be laying. From November 24, 1950 to July 5, 1951 the 3 hens laid 511 eggs, an average of 170 eggs. One hen died on July 7 and another on July 12 after sharing the production of 7 eggs with the third hen. From July 12 to November 2, 1951, the remaining hen laid 67 eggs before she died on the latter date. Assuming only average production over the span of 344 days, the third hen would have a total production of 240 eggs. A post-mortem examination of the last female revealed that her ovary contained approximately 508 immature follicles ranging from 3 mm downward. Eggs were set at regular intervals and chicks hatched, showing that the male was fertile and active.—*R. E. Roberts.* (Biological Abstracts)

BALDISSERA NORDIO, C. 1954. EFFETTI DELLA SOMMINISTRAZIONE DI PROGESTERONE SUI CARATTERI SESSUALI E SULLA SPERMIOGENESI DI *GALLUS GALLUS*. [THE EFFECTS OF PROGESTERONE ON THE SEXUAL CHARACTERS AND SPERMATOGENESIS OF *G. GALLUS*.] *Riv. Zootec., 27:* 296-300.—The av. weight of comb and testicles of 4 cocks injected intramuscularly for 20 days with a 10% solution of

10 mg. progesterone per head per day was 9.9 and 6.3 g. resp. *v.* 36.0 and 16.2 g. in controls. The av. weight of comb and testicles of 5 cocks receiving similar amounts of progesterone in a 5% solution was 26.9 and 9.5 g. resp. *v.* 36.2 and 15.7 g. in controls. Histological changes in the organs concerned are described and illustrated. (Animal Breeding Abstracts)

BERG, R. W. and SHOFFNER, R. N. (Univ. Minnesota, St. Paul.)
THE RELATIONSHIP BETWEEN BODY MEASUREMENTS AND MEAT YIELD IN TURKEYS. *Poultry Sci.*, 1954, *33*, 1042. *Proc.* (Nutrition Abstracts and Reviews)

BOLTON, W. 1953. (Poult. Res. Centre, Edinburgh.)
THE EFFECT OF SEX HORMONES ON COMB GROWTH IN IMMATURE PULLETS. *J. Endocrin., 9:* 440-445.—Twenty-four 11-wk. Brown Leghorns were injected with testosterone propionate (TP), oestradiol dipropionate (ODP) and/or progesterone (P). The 3 hormones used together caused the greatest increase in comb growth, and TP caused a greater increase than TP used with one of the other hormones; no increase was obtained when TP was not used. The comb was typically ♂ when TP alone was used, and typically ♀ when all 3 were injected. Histological studies are described. (Animal Breeding Abstracts)

BONADONNA, T. 1954. (1st Sper. Ital. "L. Spallanzani" Fecond. Artif., Milan.)
OBSERVATIONS ON THE SUB-MICROSCOPIC STRUCTURES OF *GALLUS GALLUS* SPERMATOZOA. *Poult. Sci. 33:* 1151-1158.—Observations of cock spermatozoa under the electron microscope are described. Micro-photographs show that the fundamental features of the filamental conformation are, on the whole, similar to those of mammalian spermatozoa [*see A.B.A., 22*, Nos. 551 and 847]. (Animal Breeding Abstracts)

CAMMAYO, JUSTO G. (University of the Philippines, College of Agriculture, College, Laguna, Philippines).
COMPARISON OF THE RATES OF GROWTH AND MORTALITY OF NEW HAMPSHIRE AND SINGLE COMB WHITE LEGHORN CHICKENS. *Philippine Agriculturist 38:* 181-190. 1954.—The New Hampshire chicks maintained consistently higher weekly weights than the Single Comb White Leghorns throughout the experiment. The mean difference in weight between the males of the two breeds was not significant in the first three trials, but it was in trial IV. Among the females, the difference was not significant in trials I and III but it was in trials II and IV. As expected, the S.C. White Leghorns required a smaller amount of feed for a kilogram gain but they had a higher rate of mortality than the New Hampshires.—*F. M. Fronda.*

CAMPOS, A. C., and F. M. FRONDA. 1954. (Centr. Exp. Sta., Philippines, Laguna.)
THE EFFECT OF SYNTHETIC ESTROGEN IMPLANTATION ON GAIN IN WEIGHT AND SUBSEQUENT REPRODUCTIVE ABILITY OF YOUNG S.C. WHITE LEGHORN COCKERELS. *Philipp. Agric., 37:* 473-478.—At the Department of Animal Husbandry, fifty 2½- to 3-mth-old S.C. White Leghorn cockerels were implanted with 15 mg. diethylstilboestrol and compared over a 20-wk. period with 50 controls. The treated birds showed greater and more uniform gains in weight and at the end of the period weighed 1790±37.8 g. *v.* 1739.4±49.6 g. of the controls. The maximum difference in gain was observed during the 6th week. There was no mortality among experimental birds; 26% of the controls died. At the end of the period all but 5 birds had recovered from implantation and exhibited normal mating behaviour. Fertility tests indicated that the oestrogen-treated ♂♂ had a normal level of fertility, although their fertilizing capacity was somewhat inferior to that of the untreated ♂♂. (Animal Breeding Abstracts)

CHURY, J., and R. SVEC. 1953. (Zootech. Inst., Agric. Coll., Brno.) (Russian summary.)

PRISPEVEK K VEGETATIVNI HYBRIDISACI ZIVOCICHU. [VEGETATIVE HYBRIDIZATION IN ANIMALS.] *Sborn. vysoke Sk. Zemed. Lesnicke Fak.* [*Brno*], *Spisy Fak. vet., 1:* 21-34.—Exchanges of 1-6 $cm.^3$ egg albumen were made between Leghorn, Wyandotte, Minor [*sic*] and Sussex eggs; intra-breed exchanges served as controls. Five chicks hatched from 50 treated eggs; there were 1 each of Leghorn×Wyandotte, Wyandotte×Wyandotte, Sussex×Minor, and 2 of Minor×Wyandotte. The chicks hatched from the experimental eggs had a greater body weight, developed better and were more vigorous; there were also differences in comb structure. Body weight and comb structure were not affected in the Wyandotte×Wyandotte chick.—*B. M. Slizynski.* (Animal Breeding Abstracts)

CONNER, MARK H., and C. S. SHAFFNER. (U. Maryland, College Park.)

EFFECT OF ALTERED THYROIDAL AND GONADAL ACTIVITY ON SIZE OF ENDOCRINE GLANDS AND RESISTANCE TO STRESS IN THE CHICK. *Endocrinology 55:* 45-53. Illus. 1954.—Stress caused a marked adrenal enlargement, due to increase of both medullary and cortical tissue, which was generally unaffected by variations in thyroxine or gonadal hormone levels. This enlargement was indicative of but not necessarily allied with a successful resistance to stress. Since adrenal enlargement occurred in goitrous chicks exposed to stress, without concurrent gonadal atrophy, and in androgen-treated birds which were stressed, the pituitary does not necessarily shift its activity in response to increased demand for one of its hormones. Androgen increased the ability to resist stress somewhat more in females than in males. Untreated males resisted stress better than comparable females, and thyroprotein increased the resistance in both sexes.—*From auth. summ.* (Biological Abstracts)

COTTE, J.

LA CHOLINE DE L'OEUF EN INCUBATION. [CHOLINE IN THE EGG DURING INCUBATION.] *C.R. Acad. Sci.*, 1954, *238*, 2569-2571.—The total choline content of the hen's egg remained constant up to the 13th day, then decreased steeply during the 3rd week of incubation. The choline in the embryo increased throughout incubation, more rapidly than embryo weight up to the 15th day and then more slowly. The daily choline increment per 100 g. embryo reached a maximum, as did also the free choline in the remainder of the egg, at the 14th day. Both then fell as the total choline content decreased.

It was concluded that the choline as lecithin was converted to a water-soluble form before being metabolized by the embryo.—*A. Hepburn.* (Nutrition Abstracts and Reviews)

COUNE, F. L., and J. CLYDE DRIGGERS. (U. Florida, Gainesville.)

THE INFLUENCE OF ETHYLENEDIAMINE TETRA ACETIC ACID ON SERUM CALCIUM IN MALE CHICKENS. *Poultry Sci. 33:* 1005-1009. 1954.—A total of 30 male chickens were injected with the tetrasodium salt of ethylenediamine tetra acetic acid (EDTA) in amounts varying from 50 to 200 mg/kg of body weight. Injections were made intravenously, subcutaneously, intramuscularly, and intraperitoneally. The level to which the serum Ca is lowered by injections of EDTA is shown to be influenced by the rate, amount, and mode of injection. Simultaneous injection of calcium gluconate prevented lowering of serum Ca to fatal levels when EDTA was injected intravenously in the amount of 200 mg/kg of body weight.—*F. L. Coune.* (Biological Abstracts)

DINNING, J. S., R. NEATROUR and P. L. DAY. (Dept. Biochem., Univ. Arkansas Sch. Med., Little Rock.)

THE EFFECT OF FOLIC ACID DEFICIENCY ON THE METABOLISM OF CHOLINE BY CHICK BONE MARROW. *J. Biol. Chem.*, 1954. *209*, 717-721.—The incorporation of choline into phospholipins by chick bone marrow *in vitro* was investigated manometrically with cho-

line chloride labelled with ^{14}C. The process was stimulated by presence of adenosine triphosphate. When bone marrow was obtained from chicks given purified diets it was found that deprivation of folic acid caused a rise of oxygen consumption and a loss of choline oxidase with increased incorporation of choline into phospholipins. There was also increase of succinoxidase activity in the bone marrow cells from deprived chicks.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

ENGELMANN, C. 1954. (Inst. landw. Versuchs- u. UntersuchWesen, Rostock). (English summary.)
BEFIEDERUNGSTYPEN UND BEFIEDERUNGSPHASEN BEIM GEFLUGEL. [TYPES AND PHASES OF FEATHERING IN POULTRY.] *Arch. Geflügelk., 18:* 438-453.—Feather growth is described in hens, ducks, geese and pigeons. Eight centres from which feathers develop are distinguished. (Animal Breeding Abstracts)

FRAPS, R. M., and M. H. CONNER, 1954. (U.S. Dept. Agric., Beltsville, Md.)
NEUROHYPOPHYSIAL CONTROL OF FOLLICULAR MATURATION IN THE DOMESTIC FOWL. *Nature [Lond.], 174:* 1148-1149.—The suppressing agents phenobarbital sodium, diallylbarbituric acid and pentobarbital sodium, the anticholinergic drug atropine sulphate, and the adrenergic blocking agents SKF-501 and "Dibenamine" administered 38 hrs. before the expected time of ovluation (but not when administered 24 hrs. earlier) caused the suppression of ovulation in 90%, 80%, 55%, 67%, 77%, and 90% resp. of the hens injected. Almost certainly, these results indicate the blockade of a nervous mechanism controlling some essential pre-ovulatory process. On the basis of circumstantial evidence it is suggested that the maturing follicle of the hen secretes progesterone, or a physiologically equivalent steroid, and that this hormone, rather than oestrogen, "excites" the mechanism for the release of ovulation-inducing hormone. (Animal Breeding Abstracts)

GARREN, HENRY W., and C. S. SHAFFNER. (U. Maryland, College Park.)
FACTORS CONCERNED IN THE RESPONSE OF YOUNG NEW HAMPSHIRES TO MUSCULAR FATIGUE. *Poultry Sci. 33:* 1095-1104. 1954.—Young New Hampshire chickens were subjected to forced muscular exercise in revolving cages. Periodic induction of muscular fatigue caused an enlargement of the adrenal glands and a reduction in t e weight of the thymus, the bursa of Fabricius, and the spleen. Males seemed to be more resistant to fatigue than females. Thiouracil administration lowered the resistance to fatigue, the most resistant individuals among the treated birds being males with the greatest thyroid enlargement. Iodinated casein and testosterone treatment seemed to enhance resistance, but cortisone injections at the levels given had no noticeable effect.—*Auth. summ.* (Biological Abstracts)

GONZAGA, A.C., and K. J. SIMON. 1954. (Coll. Vet. Med., Univ. Philippines, Quezon City.)
OBSERVATIONS ON THE ACTIONS OF DIETHYLSTILBESTROL ON PULLETS. *Indian vet. J., 30:* 435-445.—Implantations and injections of diethylstilboestrol in White Leghorn and native pullets increased weight temporarily, and changed conformation to the mature type. Sexual receptiveness was increased and the ovaries were larger than those of the controls. The treated birds matured earlier, and over an 8-wk. period 9 birds implanted with stilboestrol laid 124 eggs *v.* 51 eggs laid by 9 control birds. Large doses induced abnormal enlargement of the oviduct and cystic ovaries. (Animal Breeding Abstracts)

GOODMAN, B. L. and G. F. GODFREY. (Oklahoma Agric. Expt. Stat., Stillwater.)
SOURCES AND MAGNITUDE OF VARIATION IN NINE-WEEK BODY WEIGHTS. *Poultry Sci.*, 1954, *33*, 1056. Proc. (Nutrition Abstracts and Reviews)

GRATTAROLA, M. M. 1954 (1st Zootec. Casear. Piemonte. Turin.) (English summary.)
CASTRAZIONE ORMONALE DEI PULCINI. [THE HORMONAL CASTRATION OF CHICKS.] *Ann. Sper. agr.*, N.S., *8:* 1471-1484.—Live weight 60 days after the subcutaneous implantation of 25 mg. stilbene in 6 White Leghorn ♂ chicks at 25 days of age averaged 981 g. *v.* 900 g. in 6 controls. (Animal Breeding Abstracts)

HAFEZ, E. S. E. (Fac. Agric., Univ. Cairo.)
ORGAN DEVELOPMENT IN RELATION TO EGG-LAYING CAPACITY IN THE FOWL. *J. Agric. Sci.*, 1954, *45*, 148-155. (Nutrition Abstracts and Reviews)

HAVERMANN, H., and R.-M. WEGNER. 1954. (Inst. Tierz. Tierfütter., Univ. Bonn.) (English summary.)
GESCHLECHTSSORTIERUNG AUF GRUND DER FLUGELFARBUNG BEI RHODELANDER- UND NEW HAMPSHIRE-KUKEN. I. MITTEILUNG. [SEXING OF RHODE ISLAND RED AND NEW HAMPSHIRE CHICKS BY WING COLOR. Pt. I.] *Arch. Geflügelk., 18:* 165-170.—Jaap and Kosin's method of sexing R.I.R. and New Hampshire chicks by the wing down color is described. During the 1953 brooding season 1244 N.H. chicks were sexed with a 77.7% degree of accuracy. It is hoped that this will be improved with more experience. (Animal Breeding Abstracts)

HEIM, W. G. and A. M. SCHECHTMAN. (Dept. Zool., Univ., California, Los Angeles.)
ELECTROPHORETIC ANALYSIS OF THE SERUM OF THE CHICKEN DURING DEVELOPMENT. *J. Biol. Chem.*, 1954, *209*, 241-247.—Serum was obtained from chicken embryos of 10 to 21 days incubation age, from chickens up to 3 months old and from adult cocks and laying hens. The average mobilities of the component proteins and the percentage composition are presented in tables and diagrams.
Pre-albumin components, probably not identical, occurred in sera from embryos and laying hens, but not in males or immature females. Albumin represented about 30 per cent. of the total protein at all stages. α-Globulin decreased and β-globulin increased during embryonic life and γ-globulin increased for some days before and after hatching.—*D. Duncan.* (Nutrition Abstracts and Reviews)

HILLERMAN, JOHN P., and WILBOR O. WILSON. (U. California, Davis.)
ACCLIMATION OF ADULT CHICKENS TO ENVIRONMENTAL TEMPERATURE CHANGES. *Amer. Jour. Physiol. 180:* 591-595. 1955.—The reaction of hens to sudden changes in climate was compared with their reaction after adaptation to warm air. Body temperature regulation differed with breeds and was more highly developed in red jungle fowl. Water consumption was necessary for adequate temperature regulation of chickens. Acclimation modified the effects of high temperature; it required 3-5 days regardless of direction—hot to cool or cool to hot. Respiration rate required a longer period of acclimation, approximately 8-10 days. At high air temperatures laying hens had higher body temperature, higher respiration rate, and higher water consumption than non-laying hens.—*Authors.* (Biological Abstracts)

HORITA, AKIRA, and T. A. LOOMIS. (U. Washington, Seattle.)
THE INFLUENCE OF ANTICOAGULANTS ON THE FORMATION AND REGRESSION OF EXPERIMENTAL ATHEROSCLEROSIS. *Jour. Exptl. Med. 100:* 381-390. 1954.—Actions of anticoagulants on formation and regression of experimentally-induced atherosclerosis were studied. Seven-week-old cockerels were placed on a 2% cholesterol-5% oil-mash diet for periods of 8 and 12 weeks, during which continuous treatment with either heparin or dicoumerol was given. During this time growth, serum cholesterol and lipid P were determined bimonthly. Microscopic examinations of both aortae and coronary arteries were made using hematoxylin-eosin and/or Sudan IV stains. After the 8

weeks cockerels treated with either heparin or dicoumerol exhibited a marked protection as compared with the untreated cholesterol-fed group. Means of serum cholesterols of the treated groups also was significantly lower than those in untreated animals. After 12 weeks on the experimental regimen the anticoagulant protection was almost absent. Likewise, the mean serum cholesterols of anticoagulant-treated and untreated groups no longer showed a significant difference. During both the 8- and 12-week periods serum exhibited marked turbidity even in heparin-treated group. The 2nd series of experiments was concerned with the action of anticoagulants on the regression of atherosclerosis in the chick. After being fed a high cholesterol diet for 12 weeks the chicks were divided into 3 groups, and maintained on a plain mash diet for an additional 10 weeks, during which time heparin and dicoumerol were administered to 2 of the groups. Serum lipids were determined bimonthly throughout the experiment. At the end of the experiment gross and microscopic examinations were made of the aorta and other vessels. The results from this series of experiments demonstrated no beneficial effect of heparin or dicoumerol on the regression of experimentally-induced atherosclerosis in the chick. Not only the regression of the lesions but also the serum lipid picture was uninfluenced by the prolonged anticoagulant treatment.—*Akira Horita.* (Biological Abstracts)

HUTCHINSON, J. C. D. (Poultry Res. Centre (A.R.C.) West Mains Road, Edinburgh.)

A SIMPLE CLIMATIC CHAMBER FOR PHYSIOLOGICAL WORK WITH POULTRY. *Jour. Agric. Sci. 44:* 361-368. 1954.—The construction and performance of a simple climatic chamber is described. Air temperature and humidity can be controlled to permit accurate tests of heat tolerance of poultry lasting for a few hours or for long term experiments.—*R. E. Burns.* (Biological Abstracts)

JAAP, R. G., and H. ROBERTSON. 1953. (Dep. Poult. Sci. Ohio State Univ., Columbus.)

THE CHICK COMB RESPONSE TO ANDROGEN IN INBRED BROWN LEGHORNS. *Endocrinology, 53:* 512-519.—Inter-line differences in comb size were noted on the 2nd day after hatching. The response to androgen applied daily from the 2nd to the 9th day after hatching depended on initial comb size and on the concentration of androgen. The increase was not appreciably different in 6 of the 7 treated inbred lines. (Animal Breeding Abstracts)

KAMINSKI, Z., O. KARDWMYWICZ, Z. PIOTROWICZ, and Z. ZEBRACKA-SZCZESNA. (Agric. Sch., Krakow.)
(In Polish with English summ.)

Z DOSWIADCZEN NAD WYMIANA BIALKA W JAJACH WYLEGOWYCH. [EXPERIMENT ON THE EFFECT OF INTERCHANGE OF EGGWHITE IN POULTRY EGGS ON THE OFFSPRING.] *Folia Biol. 2:* 287-289. 1954.—Samples of 10 ml of egg white were transferred from Rhode Island into Leghorn hen eggs, and samples of 4 ml from duck into turkey eggs. No effect on the morphological characters of the offspring.—*A. Pigon.* (Biological Abstracts)

KODINECZ, G., and B. LACZA. 1954 (Res. Inst. Breed. Farm Anim., Gödöllo.) (Russian and English summaries.)

ULTRAIBOLYA SUGARAK ALKALMAZASA A TENYESZTOJASOK KELTETESENEL. [THE USE OF ULTRAVIOLET RAYS FOR HATCHING EGGS.] *Allattenyesztes, 3:* 257-262.—Eggs were subjected to ultraviolet rays from quartz lamps before setting. Embryonic mortality was reduced, hatchability was increased by 3.3-18.9%, and birth weight was increased by from 1.6 to 3.6 g.—Abstract of summaries. (Animal Breeding Abstracts)

KRZANOWSKA, HALINA. (Zootechn. Inst., Puławy.)
(In Polish with English summ.)

BADANIE ZYWOTNOSCI MIESZANEJ SPERMY KOGUTOW. [INVESTIGATIONS ON THE ACTIVITY OF MIXED COCK

SEMEN.] *Folia Biol. 2:* 169-184. Illus. 1954.—The activity of spermatozoa of cocks of 5 breeds was investigated independently by 3 methods, based on (1) decoloration of methylene blue under anaerobic conditions, (2) speed of upward movement of spermatozoa in vertical glass capillaries, and (3) survival time of spermatozoa stored in 42°C. Samples of semen mixtures from 2 cocks of the same or different breeds were compared with control samples of each cock separately. The activity of the mixtures was on average of the activities of the components. Likewise, speed of upward migration of spermatozoa in glass capillaries is the same, irrespective whether in own or foreign seminal plasma.—*A. Pigon.* (Biological Abstracts)

MA, CHUENG-SHYANG. (Natl. Taiwan U., Taiwan (Formosa).)
MECHANISM OF DIFFERENCES IN GROWTH RATE BETWEEN COCKERELS AND PULLETS. *Poultry Sci. 33:* 1028-1031. 1954.—Pullets given testosterone propionate showed greater increase in weight than their paired fed controls. Their rate of growth was similar to that of control cockerels.—*H. Branion.* (Biological Abstracts)

MORAVEC, D. F., F. E. MUSSEHL, and D. M. PACE. 1954. (Nebraska Agric. Exp. Sta., Lincoln.)
PHYSIOLOGICAL CHARACTERISTICS OF TURKEY SEMEN. 2. FACTORS AFFECTING MOTILITY AND FERTILIZING CAPACITY. *Poult. Sci., 33:* 1126-1129.—Six lots each consisting of 9 Broad Breasted Bronze turkey hens were artificially inseminated during the 1950 breeding season. In the first 2 lots semen was undiluted; in the other 4, a synthetic diluent containing 60 mg.% fructose was used at 0, 24, 48 and 72 hrs. after collection. Mean hatch of fertile eggs with 0.01 volume of undiluted semen per hen was 76%, with diluted semen used immediately 65%, and at 72 hrs. 14%. Pre-insemination data showed that the addition of fructose enabled sperm to live for longer periods but that the fertilizing capacity of spermatozoa decreased as the length of time *in vitro* increased [*see A.B.A., 21,* No. 462]. A table showing the relationship between number and motility of spermatozoa and the fertilizing capacity of turkeys indicates that motility may be a criterion of semen fertility, but it is not an entirely reliable one. (Animal Breeding Absracts)

MORENG, ROBERT E., and REECE L. BRYANT. (N. Dakota Agric. Expt. Sta., Fargo.)
EFFECTS OF SUB-FREEZING TEMPERATURE EXPOSURE ON THE CHICKEN EMBRYO. 2. HATCHABILITY, CHICK WEIGHT AND SURVIVAL TO SIX WEEKS. *Poultry Sci. 33:* 987-991. 1954.—Unincubated and incubated New Hampshire chicken eggs in lots of 20 to 30 eggs each, and in daily stages of development, were exposed to —10°F. for various periods of time ranging from 70 to 125 minutes. The eggs were then returned to the incubator for the duration of the 21 day incubation period. Eggs which were exposed to —10°F. for as long as 85 minutes, up to 17 days of age, were only slightly limited in their hatching power. However, the treatment had severe effects on the hatching power of the egg exposed on 18, 19, and 20 days of incubation. When exposure time was increased beyond 85 minutes by 10 minute intervals, hatchability of the eggs sharply declined until at 125 minutes only a few embryos hatched when treated beyond 3 days of age. Chicks hatched from treated eggs averaged 2 g heavier in body weight than chicks from the untreated control eggs. These chicks grew at a slightly slower rate and had a higher mortality rate than the chicks from untreated egg in a growth period up to 6 weeks of age.—*R. E. Moreng.* (Biological Abstracts)

NISHIDA, S. 1952.
ON THE ABNORMAL MITOSIS IN THE TESTIS OF DOMESTIC DUCK. *Jap. J. zootech. Sci., 23:* 186-188. [? In Japanese.] From abstract in *Rec. Res. Fac. Agric. Univ. Tokyo,* 1954, No. 3: 96.—Several kinds of mitotic abnormalities (chromosome bridges, lagging chromosomes, tripolar division), as well as binucleate giant cells, were found

in the testes of domestic ducks during March, April, and Oct. The binucleate giant cells probably arose through the fusion of 2 germ cells or through nuclear division without cell division. (Animal Breeding Abstracts)

NISHIYAMA, H. 1954. (Lab. Zootech., Kyushu Univ., Fukuoko.) (Japanese with English summary.)
ON THE CHARACTERISTICS OF THE TRANSPARENT FLUID. I. ORIGIN OF TRANSPARENT FLUID STUDIED WITH AID OF P^{32}. *Jap. J. zootech. Sci., 25:* 102-104.—The evidence here presented supports the view that the transparent fluid which is a constituent of cock semen is formed from the blood. (Animal Breeding Abstracts)

OLSEN, M. W., and S. J. MARSDEN. 1954. (Anim. Poult. Husb. Res. Branch, U.S. Dep. Agric., Beltsville, Md.)
MORTALITY AMONG TURKEY EMBRYOS IN RELATION TO RATE OF EMBRYONIC DEVELOPMENT. *Poult. Sci., 33:* 1146-1151.—Out of 4406 eggs candled between 2nd April and 17th June, 3412 had detectable embryos at 24 hrs. of incubation, *i.e.*, 95.3% of the 3580 embryos detected up to 72 hrs. Of the embryos visible at 24 hrs., 79.4% developed into normal poults. At 32 hrs., 66 embryos were detected in 994 eggs, but only 22 hatched out; at 48 hrs., 65 embryos were detected in 928 eggs but only 18 hatched out, and at 72 hrs. there were 37 embryos in 863 eggs of which only 3 hatched out. Those embryos which did not develop till 32, 48 and 72 hrs. represented undesirable types of low viability. The number of retarded embryos tended to increase as the season advanced, with a corresponding decrease in hatchability. On further incubation of the 826 eggs classed as infertile at 72 hrs., growth of embryonic membranes was found in 151 broken out eggs, but no visible embryos. It is suggested that these were infertile eggs which developed parthenogenetically [*see also* No. 922]. (Animal Breeding Abstracts)

OLSEN, M. W., and S. J. MARSDEN. (Bureau Animal Indust., Beltsville, Md.)
DEVELOPMENT OF UNFERTILIZED TURKEY EGGS. *Jour. Exptl. Zool. 126:* 337-347. Illus. 1954.—A delayed and abnormal type of development was found in 14.1% of 1400 eggs laid by a group of 23 virgin Beltsville Small White turkey hens. Certain individual birds produced more eggs of this type than others, the incidence varying from 0 to 49.1%/hen. Development began while the eggs were still in the oviducts and was revived later when the eggs were incubated. When found, development was always retarded and could not be detected by candling sooner than the 3rd or 4th day of incubation. In most instances no well-defined embryo could be detected macroscopically even after 8 or 10 days of incubation although serial cross sections of the developing blastodiscs showed a tendency for a definite organization on the part of centrally located cells. The extraembryonic membranes usually discontinued their growth after covering an area of the yolk surface equal to that occupied by those of normal 2 or 3 days embryos. Of 198 eggs in which this type of development was observed, blood was present in 10 eggs, and recognizable but abnormal embryos in 3 eggs. Since in these tests the possibility of fertilization by sperm was eliminated, it is concluded that the cellular proliferation was initiated by some other stimulus.—*Auth.* (courtesy Wistar Bibl. Serv.).

PINO, J. A., L. S. ROSENBLATT, and C. B. HUDSON. (Rutgers U., New Brunswick, N.J.)
INHIBITION OF PITUITARY GONADOTROPIN SECRETION IN DOMESTIC FOWL BY ENHEPTIN (2-AMINO, 5-NITROTHIAZOLE). *Proc. Soc. Exptl. Biol. and Med. 87:* 201-207. Illus. 1954.—Evidence is presented on the nature of the action of the drug Enheptin (2-amino, 5-nitrothiazole) in causing sexual inhibition in the domestic fowl. Alleviation of sexual inhibition was accomplished in White Leghorn

cockerels with exogenously administered gonadotropins. Assay of pituitaries from treated cockerels showed reduction in pituitary gonadotropin hormone content. Interference with thyroid activity was eliminated as a possible mechanism in causing sexual inhibition.—*J. A. Pino.* (Biological Abstracts)

RAUCH, W. 1954 (BundesforschAnst. Kleintierz., Celle.) (English summary)
BIOPHYSIKALISCHE MESSUNGEN AN BRUTEIERN. [BIOPHYSICAL MEASUREMENTS OF INCUBATING EGGS.] *Arch. Geflügelk., 18:* 297-304.—At the Institute at Celle, shells of Leghorn eggs were classified, on hatching, according to width of pore (range 6-42μ), decrease in weight (0.05-0.35%) and thickness of shell (0.18-0.42 mm.) Best hatchability results were obtained with an av. pore width of 24-30μ, a daily weight decrease of 0.15-0.20% and a shell thickness between 0.26 and 0.30 mm.

A further experiment was carried out with 974 potentially good and 741 potentially poor Legbar eggs, as determined by the above shell classification. Hatchability results were 89% and 40%, and the coefficients of variation of daily decrease in weight 27% and 53% resp. The difference was statistically significant and therefore better results were obtained with eggs having a lower daily av. decrease in weight. (Animal Breeding Abstracts)

ROMIJN, C. (Lab. Vet.-Physiol., Reichsuniv., Utrecht.) (English summary.)
UNTERSUCHUNGEN UBER KUNSTLICHE BEBRUTUNG VON HUHNEREIERN. I. PHYSIOLGISCHE UNTERSUCHUNGEN. [ARTIFICIAL INCUBATION OF HEN EGGS. 1. PHYSIOLOGICAL INVESTIGATIONS.] *Arch. Geflügelk.*, 1954, *18*, 173-183.—This resumé of work by the author on the chick embryo, reported more fully elsewhere, includes a table showing the bodyweight, oxygen consumption and R.Q. corrected for CO_2 given off by the shell for each day of incubation, as well as a diagram showing the changes in composition of the gas in the air space. Oxygen consumption begins to rise rapidly about the 10th day, along with bodyweight, and the percentage of oxygen in the air space falls. Diffusion experiments showed that most of the oxygen required has to come through the part of the egg shell covering the air space. The most favorable conditions were a relative humidity of from 56 to 58 per cent., raised to 75 or even more when the chicks began to emerge.—*W. M. Deans.* (Nutrition Abstracts and Reviews)

ROMIJN, C. and A. H. J. VISSCHEDIJK. (Lab. Vet. Physiol., Rijksuniv., Utrecht.) (English and French summaries.)
UNTERSUCHUNGEN UBER KUNSTLICHE BEBRUTUNG VON HUHNEREIERN. [ARTIFICIAL INCUBATION OF HEN EGGS.] *Arch. Geflügelk.*, 1954, *18*, 242-258.—A study of temperature and ventilation. (Nutrition Abstracts and Reviews)

SADLER, W. W., H. S. WILGUS, and E. G. BUSS. 1954. (Colorado Agric. Exp. Sta., Fort Collins.)
INCUBATION FACTORS AFFECTING HATCHABILITY OF POULTRY EGGS. 2. SOME EFFECTS OF CARBON DIOXIDE UPON MORPHOGENESIS. *Poult. Sci., 33:* 1108-1115.—The incubation of eggs at different CO_2 pressures showed that levels of 2.3% and over markedly reduced the *p*H of the albumen, retarded the breakdown of the chalaziferous membrane and thus stimulated embryonic development during the first 48 hrs. of life. There was a marked drop in tolerance on the 3rd day from 4% CO_2 to 1%, probably because the embryo itself first starts producing CO_2 then. Trials made to test the effect of increased CO_2 on eggs from the 10th day of incubation to hatching time showed that the developing chicks has a high tolerance for CO_2 after the 10th day. There were no differences in hatchability or time of hatching between control and experimental groups, but chicks from high CO_2 boxes appeared to be of slightly better quality and weight than those from the controls. Observations indicate a

need for measurement and control of CO_2, O_2 and air flow, in addition to temperature and humidity. (Animal Breeding Abstracts)

SASAKI, K., Y. TANABE, and T. HOSODA. 1953. (? In Japanese.)
SEROLOGICAL STUDIES ON THE EGG LAYING IN THE FOWL. (VI). ON THE ENDOCRINE CONTROL OF SERUM VITELLIN IN IMMATURE CHICKEN WITH SPECIAL REFERENCE TO THEIR AGES, SEXES AND BREEDS. *Jap. J. zootech. Sci., 24* (Suppl. 1): 7. From abstract in *Rec. Res. Fac. Agric. Univ. Tokyo, 1954, No. 3:* 95-96.—The minimal and optimal doses of stilboestrol necessary for the occurrence of serum vitellin in immature White Leghorns of different ages were investigated. At 20 and 40 days of age there was no significant difference between ♂♂ and ♀♀. At 60 and 90 days ♂♂ required much more oestrogen than did ♀♀ for the production of serum vitellin. In general, the dosage: body weight ratio became smaller as age increased. The responses of 40-day-old birds of a broody breed (Nagoya) appeared to be slightly delayed compared with that of White Leghorn chickens of the same age and receiving the same dosage of oestrogen. No increase in the serum vitellin of 20-day-old birds was produced when thyroxine and stilboestrol were injected simultaneously. On the contrary, the serum vitellin which had already been induced by oestrogen injection decreased in amount and disappeared. (Animal Breeding Abstracts)

SCHWEIZERISCHE GEFLUGELZUCHTSCHULE (Zollikofen-Berne/Switzerland.)
COMPARATIVE EXPERIMENTS WITH HORMONES IN BROILER PRODUCTION. (VERGLEICHENDE VERSUCHE MIT MASTHORMONEN). XIX. *Annual Report, Swiss Poultry Breeding School, Zollikofen-Berne* 1954.—The addition of 0.1, 0.15 and 0.2% 4-methyl-thiouracil or 6-methyl-thiouracil to the broiler mash resulted in increased fat deposition. Thyroid weights of all treated animals were at least doubled, testicle weights in the contrary much reduced. The adrenals showed only little weight differences. The livers of the thiouracil animals were much enlarged and of spongy structure.—*(A. Schürch)*

SHIRLEY, RAY L., J. CLYDE DRIGGERS, JOHN T. McCALL, MARSHALL NIRENBERG, and GEORGE K. DAVIS. (U. Florida, Gainesville.)
THE RATE OF DEPOSITION AND TURNOVER OF P^{32} AND Ca^{45} IN THE TISSUES OF THE LAYING HEN. *Poultry Sci. 33:* 932-936. 1954.—P^{32} and Ca^{45} isotopes were concurrently given intramusc. into laying White Leghorn hens and the rate of deposition and turnover of the isotopes in 5 osseous and 13 non-osseous tissues determined at 11 intervals from 0.25 hours to 21 days after dosage. The 2 elements followed essentially the same pattern in the bones, but in the soft tissues the Ca^{45} was found to occur in much smaller concentrations and to disappear, except in traces, within 24 hours after giving the isotope. The rapid deposition and subsequent turnover in the bones indicates that P and Ca undergo especially rapid metabolism in the laying hen. Excretion of the 2 elements after giving parenterally was compared with that after oral dosage.—*R. L. Shirley.* (Biological Abstracts)

SKALLER, F., and B. L. SHELDON. (Poultry Res. Centre, Werribee, Vic.)
INTERACTIONS OF GENOTYPE AND ENVIRONMENT IN DETERMINING SEXUAL MATURITY IN THE DOMESTIC FOWL. *Australian Jour. Agric. Res. 6:* 171-185. 1955.—Sexual maturity data of 1762 pullets from 4 differently bred flocks, were examined for interaction between genotype for age at sexual maturity and the environment as represented by different hatching dates. Interaction was significant in 2 of the flocks studied and there was some interaction, though not significant, in the other flocks. Progressively later hatching caused significant increases in age at maturity in all flocks, but large differences in sexual maturity between sire families did not occur. The

occurrence of interaction in other flocks and its effects on current poultry breeding methods are discussed. It is concluded that interactions of the order of those reported in this paper are not of a sufficient magnitude to warrant revision of present methods.—*Auth. summ.* (Biological Abstracts)

SMITH, A. H., W. O. WILSON and J. G. BROWN. (Coll. Agric., Univ. California, Davis.)
COMPOSITION OF EGGS FROM INDIVIDUAL HENS MAINTAINED UNDER CONTROLLED ENVIRONMENTS. *Poultry Sci.*, 1954, *33*, 898-908.—Six hens in each of 2 experiments were given a practical laying ration with P contents of 0.8 and 1.0 per cent., respectively. Sunlight was excluded from all houses, and continuous artificial light was given. Eggs were collected twice daily and stored at 55°F. until analyzed within 1 or 2 days. In trial 1, the hens were kept at temperatures of 60°F. for 26 days, then at 80°F. for 30 days, with acclimatization periods of 34 and 33 days. In trial 2, the experimental conditions were 60°F. and 90°F. for 40-day periods, preceded by 50 days and no acclimatization period, respectively.

The eggs of the experimental birds differed from accepted standards. The shells were relatively light and the whites relatively heavy. The levels of Na and K on water content basis were the same in the white and the yolk, which suggested that these elements were in solution; the Ca levels were similar in the white and the yolk on a dry fat-free basis, suggesting that Ca was protein-bound. The P levels of yolk and white were dissimilar on any basis; 8.7 per cent. of the total P was inorganic in the white and 4.7 per cent. in the yolk. A significant positive correlation was found between inorganic P of the yolk and laying rate. There was also a slight correlation between the level of P compounds in the white and laying rate, which indicated that the deposition of inorganic P in the white was intermittent. Level of P in the shell was not affected by the laying rate. A difference was found in the Na:K ratio of white and yolk, and its bearing on embryo growth is discussed. The composition of eggs varied much between birds, but individually was nearly constant. There was a suggestion that the age of the bird influenced the composition of the egg.

The rise in ambient temperature decreased both egg size and laying rate in direct proportion. The dry matter of the yolk decreased, that of the white increased. At higher temperatures the total P level of the white and the yolk rose, but the inorganic P level of the yolk fell. These changes in composition are also associated with a low laying rate. The high temperature increased the Na and K content of the yolk, especially the Na.—*M. J. Head.* (Nutrition Abstracts and Reviews)

STURKIE, PAUL D., and R. K. RINGER. (Rutgers U., New Brunswick, N.J.)
EFFECTS OF SUPPRESSION OF PITUITARY GONADOTROPHINS ON BLOOD PRESSURE IN THE FOWL. *Amer. Jour. Physiol. 180:* 53-56. 1955.—The blood pressure level of adult White Leghorn chickens is approximately 20% higher in males than in females. The capon has the same level as the male. Diethylstilbestrol given over a period of 30 days (45 mg) suppressed sexual development and the output of pituitary gonadotropins and depressed blood pressure significantly in males and capons but had no effect on females. Pregnant mare serum, (PMS) injected at 100 rat units (R U) daily for 9-11 days to males and females whose pressure were depressed with the estrogen, returned pressures to normal level. PMS had no effect on blood pressure of females, 2-amino, 5-nitrothiazole, also suppressed sexual development, and depressed blood pressure of males and capons. —*P. D. Sturkie.* (Biological Abstracts)

TANABE, Y., R. NAKAYAMA, K. SASAKI, and T. HOSODA. 1954. (Lab. Anim. Breed., Univ. Tokyo.) (Japanese with English summary.)
SEX AND AGE DIFFERENCES IN OESTROGEN-INDUCED SERUM VITELLIN PRODUCTION IN THE CHICK. *Jap. J. zootech.*

Sci., 25: 137-141.—No sex difference in oestrogen-induced serum vitellin production was observed when oestrogen injections started on the 21st or 41st day after hatching. When the injections started on the 61st or 91st day after hatching, ♂ chicks showed a significant delay in response compared with ♀ chicks at all dosages of oestrogen. The daily dose required for the induction of serum vitellin increased with the age and live weight of the bird. (Animal Breeding Abstracts)

TANGE, M., and O. KOGA. 1954. (Lab. Zootech., Kyushu Univ., Fukuoka.) (Japanese with English summary.)
STUDIES ON THE INDUCTION OF OVULATION IN BIRDS. I. THE EFFECT OF GONADOTROPHIC HORMONE ON THE HEN'S OVARY. *Jap. J. zootech. Sci., 25:* 105-109.—Daily injections of 10 mg. of dried pituitary for 7-10 days readily stimulated the ovarian follicles of laying hens. Daily doses of 1 mg. had little effect on follicular growth, but caused a few follicles to ovulate into the abdominal cavity. The number of atretic follicles was increased by marked stimulation of the follicles. Egg production ceased in hens in which the weight of the ovary was increased to more than 150 g. (Animal Breeding Abstracts)

TOLMAN, ROBERT A. (Indiana U., Bloomington, Ind.)
A QUANTITATIVE STUDY OF THYROXIN-THYROTROPIC HORMONE INTERACTION. *Proc. Indiana Acad. Sci. 63:* 280-283. 1953[1954].—Day-old White Leghorn male chicks were injected with varying doses of thyroxin or thyroid stimulating hormone (TSH), or combinations of the two. Cell height measurements of the thyroids showed that 1 μg of thyroxin caused increased cell height instead of the expected decrease. Also, 0.025 USP units of TSH in combination with thyroxin caused cell height increases, indicating synergistic action between the hormones. Other combinations of the hormones caused decreased cell heights.—*From auth. summ.* (Biological Abstracts)

WEBER, F. and H. LORTSCHER. (Swiss Fed. Inst. Technol., Animal Breeding Inst., Zurich.)
CONCERNING THE INFLUENCE OF ENVIRONMENT ON THE FERTILITY OF WHITE LEGHORN COCKS (S.C.W.) OF DIFFERENT ORIGIN. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 37-41. (Nutrition Abstracts and Reviews)

NUTRITION

ADRIAN, J. (Lab. Biochim. Nutrit., C.N.R.S., Bellevue, Seine et Oise.)
ETUDE DE QUELQUES VITAMINES DU COMPLEXE B_2 DANS L'OEUF DE POULE. [STUDY OF VITAMIN B_2 COMPLEX COMPONENTS IN HEN'S EGGS.] *10th World's Poultry Congr. Sect.* Papers, Edinburgh, 1954, 148-149. (Nutrition Abstracts and Reviews)

ADRIAN, J. (Lab. Biochim. Nutrit., C.N.R.S., Bellevue, Seine-et-Oise.)
TENEURS DE L'OEUF DE POULE EN RIBOFLAVINE, NIACINE ET ACIDE PANTOTHENIQUE. VARIABILITE ET CORRELATIONS. [CONTENT OF RIBOFLAVIN, NICOTINIC ACID AND PANTOTHENIC ACID IN THE HEN'S EGG. VARIABILITY AND CORRELATIONS.] *Ann. Zootech.*, 1952, *1*, No. 3, 17-29.—Riboflavin, nicotinic acid and pantothenic acid were estimated microbiologically in eggs bought in the open market or obtained from hens on controlled diets. The eggs were plunged into boiling water and cooked for 10 min. so that white and yolk could be completely separated. The average amounts in μg. per whole market egg (average weight 48.9 g.) were nicotinic acid 29.45, riboflavin 224.2, and pantothenic acid 968.5. Similar values were found in eggs from hens of a known stock. Nicotinic acid and riboflavin were present in greater total amount in the white, and pantothenic acid in greater amount in the yolk. In balance experiments with 7 Rhode Island hens, the eggs contained 11.4 per cent. of the riboflavin supplied by the diet, 0.065 of the nicotinic acid and 25.2

of the pantothenic acid. There was a correlation between the riboflavin and pantothenic acid contents of the egg, but the nicotinic acid content was not related to that of the other B viamins. From the point of view of the vitamin B complex, eggs were good sources of riboflavin and pantothenic acid, but made only a very small contribution of nicotinic acid to the diet of man.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

AGDIGOS, FELICIANO B. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE OPTIMUM LEVEL OF COMMON TABLE SALT IN THE COLLEGE BROODING RATION. *Philippine Agriculturist 38:* 604-609. 1955.—The addition of 1 per cent common table salt to the College ration for growing chicks markedly improved the feeding value of the ration. The rate of growth was faster and mortality was lower during the second and third months in the lot given 1 per cent salt. This lot also required the least feed to produce a kilogram gain in weight.—*F. M. Fronda.*

AITKEN, J. R., W. G. HUNSAKER, A. B. MORRISON, and H. S. GUTTERIDGE. (Poultry Div., Central Exp. Farm, Ottawa.)
THE PROTEIN REQUIREMENT OF PILGRIM GOSLINGS. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 119-121. (Nutrition Abstracts and Reviews)

AITKEN, J. R., G. S. LINDBLAD, and W. G. HUNSAKER. (Central Exp. Farm, Ottawa, Ont.)
BEEF TALLOW AS A SOURCE OF ENERGY IN BROILER RATIONS. *Poultry Sci. 33:* 1038-1039. 1954. (Nutrition Abstracts and views)

ALMQUIST, H. J. (The Grange Co., Modesto, Calif.)
THE PHOSPHORUS REQUIREMENT OF YOUNG CHICKS AND POULTS. A REVIEW. *Poultry Sci. 33:* 936-944. 1954.—Studies on the requirement of the young chick and of the poult for P as affected by availability of the P, level and form of vit. D, and levels of Ca, are reviewed. Logarithmic analysis, or application of the diminishing returns principle, indicates that the approximate minimum requirement of the chick for readily available P is 0.45% of the diet, while that of the poult is 0.6% of the diet.—*H. J. Almquist.* (Biological Abstracts)

ANDERSON, D. L., and F. W. HILL. (Cornell Univ., Ithaca, N. Y.)
EFFECTS OF FIBROUS BULK ON THE UTILIZATION OF A HIGH ENERGY CHICK RATION FOR GROWTH. *Poultry Sci. 33:* 1038. 1954. (Nutrition Abstracts and Reviews)

ANDERSON, J. O., and C. I. DRAPER. (Utah State Agric. Coll., Logan.)
VALUE OF ALFALFA MEAL IN CHICK AND BREEDER HEN RATIONS. *Poultry Sci. 33:* 1038-1039. 1954. (Nutrition Abstracts and Reviews)

ANDREWS, F. N., H. E. PARKER, S. M. HAUGE, R. D. CREEK, and C. W. CARRICK. (Purdue Univ., Lafayette, Ind.)
THE EFFECTS OF MANGANESE DEFICIENCY ON THE GROSS AND MICROSCOPIC ANATOMY OF THE TIBIA OF THE CHICKEN. *Poultry Sci. 33:* 1039. 1954. (Nutrition Abstracts and Reviews)

ARSCOTT, G. H., G. B. SWEET, and G. F. COMBS. 1954. (Maryland Agric. Exp. Sta., College Park.)
EFFECT OF IODINATED CASEIN IN A SIMPLIFIED OAT DIET ON HATCHABILITY OF CHICKEN EGGS. *Poultry Sci. 33:* 1283-1286.—In an attempt to identify the unknown factor(s) necessary in the diet of pullets for normal hatchability, iodinated casein was one of the supplements added to a basal ration expected to be deficient in the unidentified factor(s). As the pullets receiving iodinated casein gave

a hatchability percentage of 57.5 *v.* 77.8 for the controls, it is suggested that this constituent depleted the pullets of the hatchability factor(s). (Animal Breeding Abstracts)

ATKINSON, J. C., R. V. BOUCHER, and E. W. CALLENBACH. (Pennsylvania State Univ., State College.)
WEIGHT AND MOISTURE CONTENT OF CARCASSES FROM POULTS FED ADDED SODIUM CHLORIDE. *Poultry Sci. 33:* 656. 1954.—Two groups of 10 day-old White Holland turkey poults were given similar rations, one with 2 per cent. NaCl. At 25 days of age the poults given 2 per cent. NaCl were significantly heavier than the controls, 115 g. compared with 104 g. The respective moisture contents of the carcases were 79.8 and 77.2 per cent.—*M. J. Head.* (Nutrition Abstracts and Reviews)

ATKINSON, R. L., and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)
EFFECT OF VITAMIN E AND OTHER SUPPLEMENTS ON HATCHABILITY OF TURKEY EGGS. *Poultry Sci. 33:* 1039-1040. 1954. (Nutrition Abstracts and Reviews)

AUXILIA, M. T. 1954. (1st Zootec. Casear, Piemonte, Turin.) (English summary.)
EFFETTO DEL METILTIOURACILE ASSOCIATO ALL'AUREOMICINA NELL'INGRASSAMENTO DI GIOVANI POLLI "NEW HAMPSHIRE." (PROVA DI ORIENTAMENTO.) [THE EFFECT OF METHYLTHIOURACIL AND AUREOMYCIN ON THE FATTENING OF NEW HAMPSHIRE CHICKS. (PRELIMINARY EXPERIMENT.)] *Ann. Sper. agr.*, N.S. *8:* 1239-1245.—During a 4-wk. period the live weight gain of chicks receiving a food mixture containing 100 g. methylthiouracil and 500 g. Aurofac per 100 kg. food mixture averaged 138.06% *v.* 109.18% in controls; 22 birds were involved. (Animal Breeding Abstracts)

BALDINI, J. T., and H. R. ROSENBERG. (E. I. du Pont de Nemours and Co., Inc., Newark, Del.)
LOW PROTEIN DIETS FOR THE TURKEY POULT. *Poultry Sci. 33:* 1041. 1954. (Nutrition Abstracts and Reviews)

BEGIN, J. J., D. W. MacLAURY, R. RISNER, and W. M. INSKO (JR.) (Lexington, Ky.)
BREED, SEX, AND AGE VARIATION AMONG CHICKS IN RESPONSE TO ANTIBIOTIC SUPPLEMENTATION. *Kentucky Agric. Exp. Stat. Bull.* No. 597, June 1953, pp. 12.—A group of 220 meat-type chicks was reared on a ration of soya bean oilmeal 30, alfalfa meal 5, maize distiller's dried solubles 4, dried whey 2, condensed fish solubles 2, minerals 4, choline chloride, nicotinic acid, concentrates containing vitamins A, B_{12} and D and riboflavin, and yellow maizemeal to 100. At 10 weeks of age their mean bodyweight was 1220 g.

Further groups received the same ration with the following supplements (the corresponding finishing weights in g. are given in brackets): aureomycin, 22 p.p.m. (1306); 3-nitro-4-hydroxyphenylarsonic acid, 55 (1313); bacitracin, 22 (1278); penicillin, 22 (1265); terramycin, 22 (1294); aureomycin, 22, plus sulphaquinoxaline, 125 (1352). The control group used 3.11 g. feed per g. liveweight gain. For the supplemented groups the figures were 3.02, 2.98, 3.00, 2.96, 2.93 and 2.90, respectively. Each group was made up of both males and females, each from 2 breeds.

Detailed analysis of the results suggested that the relative potency of the antibiotic supplements in stimulating growth differed with both sex and breed of the birds and with the stage of growth. Mortality was less than 9 per cent. in every group.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

BENTON, D. A., A. E. HARPER, and C. A. ELVEHJEM. (U. Wisconsin, Madison.)
THE NEED FOR SUPPLEMENTAL TRYPTOPHAN IN SEMI-PURIFIED DIET FOR CHICKS. *Poultry Sci. 33:* 1279-1280. 1954.—A supplement of tryptophan was shown to cause a significant growth response in chicks fed a semi-purified diet containing 18% casein, 10% gelatin as a protein source. The growth response was not observed when the level of casein was increased to 25% or the sucrose of the diet was replaced with dextrin.—*Authors.* (Biological Abstracts)

BERNIER, P. E., and T. COONEY. (Dept. Poultry Husb., Oregon State Coll.)
BLACK DOWN COLOR AND RIBOFLAVIN DEFICIENCY IN EMBRYOS OF THE DOMESTIC FOWL. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 66-71. (Nutrition Abstracts and Reviews)

BLACK, D. J. G., R. C. JENNINGS, T. R. MORRIS, and J. A. PALGRAVE. (Dept. Agric., Univ. Reading.)
A DEPRESSANT EFFECT OF A WHITE FISH MEAL ON HATCHABILITY. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 121-125. (Nutrition Abstracts and Reviews)

BLAYLOCK, L. G., P. VOHRA, E. B. PATTERSON and J. McGINNIS. (State Coll. Washington, Pullman.)
EVIDENCE FOR THE PRODUCTION OF CHICK GROWTH FACTOR(S) BY *ESCHERICHIA COLI. Poultry Sci. 33:* 1043. 1954. (Nutrition Abstracts and Reviews)

BOGDONOFF, P. D. (JR.), and C. S. SHAFFNER. (Univ. Maryland, College Park.)
ANTIBIOTICS AND CALCIUM METABOLISM. *Poultry Sci. 33:* 1044. 1954. (Nutrition Abstracts and Reviews)

BRIGGS, G. M., and M. R. SPIVEY. (Nat. Inst. Health, Pub. Health Serv., Bethesda, Md.)
VITAMIN A DEFICIENCY IN CHICKS PRODUCED BY FEEDING BENTONITE IN SYNTHETIC DIETS. *Poultry Sci. 33:* 1044-1045. 1954. (Nutrition Abstracts and Reviews)

BROWN, W. O. (Dept. Agric. Chem., Queen's Univ., Belfast.)
NITROGEN METABOLISM IN THE FOLIC ACID-DEFICIENT CHICK STUDIED BY A BALANCE TECHNIQUE. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 149-152. (Nutrition Abstracts and Reviews)

CACIOPPO, F. (1st Fisiol. Umana, Univ. Palermo.)
SUL MECCANISMO D'AZIONE DELLA "ORIZOTOSSINA". CONTENUTO DI ACIDO PIRUVICO NEI TESSUTI DI COLOMBI TRATTATI CON "ORIZOTOSSINA". [MODE OF ACTION OF THE "RICE TOXIN". PYRUVIC ACID CONTENT OF TISSUES OF PIGEONS TREATED WITH "RICE TOXIN."] *Quad. Nutrizione 12:* 505-520. 1952.—Of 20 pigeons fed on polished rice, 10 received in addition, by intramuscular injection, an alcoholic extract emulsified with water of from 40 to 60 g. polished rice. When the birds of the second group showed signs of inco-ordination they were killed with corresponding birds of the first group. Within 8 days all the birds given the extract showed signs of polyneuritis, and lost weight and condition very rapidly. None of the birds not given the extract did so before they were killed. The mean pyruvic acid content in mg. per 100 g. for those given and not given extract, respectively, was for muscle 1.89 and 1.28, for blood 3.22 and 1.56, and for brain 0.92 and 0.47. It is concluded that the action of the rice toxin is to promote deficiency of vitamin B_1, perhaps by interfering with the phosphorylation of the vitamin. (See Absts. 235, 1415, Vol. 5.)—*E. M. Hume.* (Nutrition Abstracts and Reviews)

CAMP, A. A., H. T. CARTRITE, J. H. QUISENBERRY, and J. R. COUCH. (Texas Agric. Exp. Stat., Gonzales.)
FURTHER INFORMATION ON UNIDENTIFIED CHICK GROWTH FACTORS. *Poultry Sci. 33:* 1047. 1954. (Nutrition Abstracts and Reviews)

CARLSON, C. W., and W. KOHLMEYER. (S. Dakota Agric. Expt. Stat., College Station.)
FACTORS AFFECTING THE VALUE OF ANTIBIOTICS IN BREEDER DIETS. *Poultry Sci. 33:* 1047-1048. 1954. (Nutrition Abstracts and Reviews)

CARPENTER, K. J. (Rowett Res. Inst., Bucksburn, Aberdeenshire.)
THE EVALUATION OF PROTEIN SUPPLEMENTS FOR EGG PRODUCTION. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 125-127. (Nutrition Abstracts and Reviews)

CARPENTER, K. J., J. DUCKWORTH, and G. M. ELLINGER. (The Rowett Res. Inst., Aberdeen.)
ECONOMIES IN THE USE OF ANIMAL BY-PRODUCTS IN POULTRY RATIONS. *Jour. Agric. Sci. 44:* 340-354. 1954.—Birds fed on rations free of animal by-products from hatching until 18 months of age were equal in laying performance and health to those that received animal supplements. Aureomycin had no effect other than stimulating early growth. Limited access to "unfermented" droppings satisfied the need for the "animal protein factor."—*R. E. Burns.* (Biological Abstracts)

CHANG, W. Y., C. L. LYMAN, and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)
EFFECT OF FREE GOSSYPOL ON CHICK GROWTH. *Poultry Sci. 33:* 1048. 1954. (Nutrition Abstracts and Reviews)

CHARLET, P., G. CHARLET-LERY, and A. M. LEROY. (Lab. Recherches Zootech., Inst. Nat. Agronom., Paris.)
UTILIZATION DE LEVURE DE DISTILLERIE DANS L'ALIMENTATION DES VOLAILLES. [USE OF DISTILLER'S YEAST IN POULTRY FEEDING.] *Ann. Zootech. 1:* No. 4, 33-42. 1952.—A group of 10 laying birds received to appetite for 12 months a ration of dried distiller's yeast 12, oilseed meals 23, wheat germ 3, miller's offals 8, alfalfa meal 5, bonemeal 4, ground limestone 5.5, barley 20 and maizemeal 20 parts; this ration contained 21.5 per cent. of crude protein. In addition, they received 30 g. oats for every 70 g. of the mixed ration consumed. Their mean egg production was 110. A second group similarly fed had 8 parts of distiller's yeast from the mixed ration replaced by only 6 parts of meatmeal to maintain the total crude protein content at the same level; their mean production in the same time was 108 eggs. The fertility and hatchability of the eggs were similar.

A group of chicks was reared on a ration of cereals, fine bran, alfalfa meal and oilseed meals, supplemented with 3 per cent. of lactalbumin and 9 per cent. of mixed blood-, meat- and fishmeal. They also received cod liver oil and an allowance of sprouted oats. At 60 days of age 13 cockerels had a mean weight of 800 g. and 16 pullets of 760 g. per head. In a parallel group receiving 14 parts of dried distiller's yeast in place of the 9 parts of mixed animal protein concentrates in the ration the mean weights at 60 days were 880 and 770 g. for cockerels and pullets, respectively. The group receiving yeast appeared to grow feathers more rapidly and more evenly.

In a further trial chicks were reared to 60 days on a good commercial starting ration supplemented with 10 per cent. of either dried brewer's or dried distiller's yeast. The performance of the chicks was equally good with either supplement.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

CHARLET-LERY, G., H. DE BALZAC, and A. M. LEROY. (Lab. Recherches Zootech., Inst. Nat. Agronom., Paris.)

VARIATION DE LA VALEUR ALIMENTAIRE DES LEVURES DE DISTILLERIE SUIVANT LEUR ORIGINE ET LEUR MODE DE PREPARATION. [VARIATION IN FEEDING VALUE OF DISTILLER'S YEASTS ACCORDING TO ORIGIN AND METHOD OF PREPARATION.] *Ann. Zootech. 3:* 215-217. 1954.—Four samples of beet yeast differently processed, one of "vinasse" yeast and 2 grown on molasses were compared. Each was given to 25 chickens from hatching to 6 weeks of age in a ration containing yeast 7 and barley meal 7 parts and a commercial chick ration to 100.

The weight gain per kg. feed consumed was significantly greater on the 4 beet yeasts than on the other types, though the total N content of the yeasts did not differ significantly. There was some correlation ($r = +0.58 \pm 0.17$) between the amount of feed consumed per kg. weight gain and the K content of the yeast.—*D. Duncan.* (Nutrition Abstracts and Reviews)

CHARLET-LERY, G., A. C. FRANCOIS, and A. M. LEROY. (Lab. Recherches Zootech., Inst. Nat. Agronom., Paris.)

INFLUENCE DU FACTEUR VITAMINIQUE A (AXEROPHTOL OU CAROTENE D'HUILE DE PALME ASSOCIE AU TOCOPHEROL) SUR LA PONTE ET LES PHENOMENES DE REPRODUCTION CHEZ LA POULE. [EFFECT OF VITAMIN A (AXEROPHTHOL OR CAROTENE IN PALM OIL ASSOCIATED WITH TOCOPHEROL) ON EGG LAYING AND PHENOMENA OF REPRODUCTION IN THE HEN.] *Ann. Zootech. 2:* No. 2, 163-176. 1953.—Hens were given 4030 μg. carotene from red palm oil, or from 1270 to 1350 μg. vitamin A palmitate, per kg. dry mash. Each supplement was supplied with or without from 5580 to 5950 μg. *dl*-α tocopherol per kg. mash, making 4 groups in all. Just before feeding, the vitamins were mixed with oats which were a component of the mash. The birds picked out the oats and ate them quickly, which minimized the loss of vitamin by oxidation. The number of eggs laid from December to July was the same whether vitamin A or carotene was given, but the percentage hatching was better with vitamin A. The tocopherol supplements had no effect. By raising the intake of vitamin A or carotene the concentration in the egg yolk could be increased.—*T. Moore.* (Nutrition Abstracts and Reviews)

CHUBB, L. G. (Poultry Res. Stat., Animal Health Trust, Huntingdon.)

FURTHER OBSERVATIONS ON THE FEEDING OF MANGANESE DEFICIENT DIETS TO GROWING AND BREEDING CHICKENS. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 164-166. (Nutrition Abstracts and Reviews)

CLEGG, R. E., R. E. HEIN, C. H. SUELTER, and R. H. McFARLAND. (Kansas State Coll., Manhattan.)

THE DISTRIBUTION OF RADIO-ACTIVE PHOSPHORUS IN THE ELECTROPHORETIC COMPONENTS OF EGG YOLK PROTEINS. *Poultry Sci. 33:* 1049. 1954. (Nutrition Abstracts and Reviews)

COMBS, G. F., G. L. ROMOSER, and R. W. BISHOP. (Dept. Poultry Husb., Univ. Maryland, College Park.)

INFLUENCE OF ARSANILIC ACID ON DIETARY REQUIREMENT OF CHICKS FOR CERTAIN UNIDENTIFIED GROWTH FACTORS. *J. Nutrition 53:* 511-522. 1954.—A group of 100 chicks was reared from hatching on a ration of soya bean oilmeal 32.5, lucerne meal 2.5, dried whey 2, butyl molasses fermentation solubles 1, minerals 3.1, DL-methionine 0.05, choline chloride, riboflavin, nicotinic acid, pantothenic acid, vitamins A, B_{12} and D, nitrofurazone, procaine penicillin and yellow maizemeal to 100. Their mean weight at 8 weeks of age was 942 g. and the mean of a further group receiving the same ration supplemented with 120 p.p.m. arsanilic acid was 918 g.

Further groups that received the original ration supplemented with 2 to 7 per cent. of fishmeal or fish soluble products finished with mean

weights ranging from 936 to 988 g. The same treatments with the addition of arsanilic acid gave mean weights ranging from 977 to 1020 g.

In 2 further trials, using slightly modified basal rations, it was again found that although arsanilic acid gave no growth stimulation in the absence of fish products, and fish products alone had only a small effect, the combination of the 2 had a significant growth-stimulating action. As an overall result from 3 trials, the addition of a mixed supplement of 90 p.p.m. arsanilic acid and 2 per cent. condensed fish solubles increased the growth rate of chicks by 6 per cent. in their first 8 weeks of life, and improved the feed conversion efficiency by 4 per cent., although the basal rations used contained all the known nutrients at levels believed to be adequate for rapid growth.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

COUCH, J. F. (Texas A and M Coll., College Station.)
USE OF MOLASSES IN POULTRY FEEDS. *Feedstuffs 26(35):* 44-45. 1954.—Molasses, when used at 2.5 and 5% levels in turkey starter feeds, did not affect the weight of the poults and feed efficiency was decreased only slightly. Similar results were obtained with chicken broilers. Economics favors the use of molasses as a substitute for corn.—*H. L. Wilcke.* (Biological Abstracts)

COUNE, F. L., and J. C. DRIGGERS. (Univ. Florida, Gainesville.)
CITRUS MOLASSES DISTILLERS DRIED SOLUBLES IN RATIONS FOR GROWING CHICKS. *Poultry Sci. 33:* 1088-1089. 1954. (Nutrition Abstracts and Reviews)

COWLISHAW, S. J., D. E. EYLES, W. F. RAYMOND and J. M. A. TILLEY. (Grassland Res. Inst., Hurley, Berkshire.)
NUTRITIVE VALUE OF LUCERNE PROTEIN CONCENTRATES, FED WITH AND WITHOUT CHOLESTEROL. *Nature 174:* 227-228. 1954.—Tests were made with a protein concentrate prepared by heat precipitation from alfalfa juice. Groups of 12 chickens were reared from hatching to 14 days on a low-protein ration and then received the test rations for another 14 days.

The gross protein values of alfalfa protein meal with 48.4 per cent. crude protein and of alfalfa and grass protein with 42.8 per cent. were 57 and 67, respectively, taking casein as 100. The addition of 0.3 per cent. cholesterol raised the values to 74 and 70. Alfalfa protein rations appeared to be less palatable than the casein ration.—*D. Duncan.* (Nutrition Abstracts and Reviews)

CREEK, R. D., H. E. PARKER, S. M. HAUGE, F. N. ANDREWS, and C. W. CARRICK. (Purdue Univ., Lafayette.)
THE IODINE REQUIREMENTS OF YOUNG CHICKENS. *Poultry Sci. 33:* 1052. 1954. (Nutrition Abstracts and Reviews)

DENTON, C. A., R. J. LILLIE, and J. R. SIZEMORE. (Bur. Animal Indust., U.S. Dept. Agric., Beltsville, Md.)
CORRELATION OF MICROBIOLOGICAL AND CHICK ASSAYS FOR VITAMIN B_{12}. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 152-154. (Nutrition Abstracts and Reviews)

DOCTOR, V. M., J. R. COUCH, and J. B. TRUNNELL. (Sect. Exp. Med., Univ. Texas, College Station.)
FACTORS INFLUENCING CONVERSION OF FOLIC ACID TO CITROVORUM FACTOR BY CHICK LIVER FRACTIONS. *Proc. Soc. Exp. Biol. Med. 87:* 228-231. 1954.—A study was made of the effect of homocysteine, cysteine, cystine, glutathione and ascorbic acid on the enzyme system in chick liver that converts folic acid to citrovorum factor. The enzyme was present mainly in the supernatant fraction obtained when a liver homogenate was centrifuged. It was precipitated by 40 per cent. ethanol. Homocysteine had a specific stimulatory effect which was not shared by the other sulphydryl compounds tested. Optimum activity was obtained in the presence of serine, homocysteine and magnesium when dried acetone extract of liver was used. It is

suggested that unidentified factors present in chick liver homogenates are required for the conversion of folic acid to citrovorum factor.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

EBBELL, H. (Ovomaltine Farm, Oberwangen bei Bern, Switzerland.) WEITERE UNTERSUCHUNGEN UBER DEN EINFLUSS EINES TERRAMYCIN-PRODUKTES AUF DAS KUCKENWACHSTUM. [FURTHER OBSERVATIONS ON THE INFLUENCE OF TERRAMYCIN ON CHICK-GROWTH.] *Archiv f. Geflügelkunde,* 1954: 184-196.—In two experiments with growing chicks of 70 days each the following groups have been tested:

1. Group I = Basal Ration + 0.1% of a Terramycin-Vitamin B_{12} supplement from day old to ten weeks.
2. Group II = Basal Ration + 0.1% of the same supplement from day old to 6 weeks.
3. Group III = Basal Ration + 0.1% of the same supplement from 6 to 10 weeks.
4. Group IV = Basal Ration alone as a control.

The basal ration—chick-all-mash from day old to 6 weeks and a broiler-all-mash from 6 to 10 weeks—was a practical type ration used on this farm and tested to give good results. The chicks have been raised in an air-conditioned brooder house under thermostatically controlled electric brooders on built-up litter being 4 resp. 7 months old at the beginning of the experiment. From 6 to 10 weeks they were further raised in used and not especially cleaned fattening cages in an air-conditioned room. Under the conditions of these experiments the Terramycin-supplement gave no definite response on growth nor did it improve feed efficincy. It has not been possible to establish the cause for these negative results with the Terramycin-supplement which are in opposition to the findings of other authors.—*Author's summ.*

EBBELL, H. (Ovomaltine Farm, Oberwangen bei Bern, Switzerland.) DER EINFLUSS VON 3-NITRO 4-HYDROXY PHENYLARSINSAURE ALLEIN UND IN KOMBINATION MIT EINEM TERRAMYCIN-PRODUKT AUF DAS KUCKENWACHSTUM. [THE INFLUENCE OF 3-NITRO-4-HYDROXYPHENYLARSONIC ACID ALONE AND IN COMBINATION WITH TERRAMYCIN ON CHICK GROWTH.] *Archiv f. Geflügelkunde,* 1955: 255-267.—In two experiments with growing chicks of 42 resp. 70 days duration the following groups have been tested:

Group I = Basal ration + 45 g 3-nitro 4-hydroxyphenylarsonic acid per ton of feed combined with 0.04% of a Terramycin supplement containing 10 g Terramycin per lb.
Group II = Basal ration + 45 g 3-nitro 4-hydroxyphenylarsonic acid per ton of feed alone.
Group III = Basal ration + 0.04% of a Terramycin supplement alone.
Group IV + Basal ration alone as a control.

The basal ration—chick-all-mash from day-old to 6 weeks and a broiler-all-mash from 6 to 10 weeks—was a practical type ration used on this farm and tested to give good results. The chicks have been raised in an air-conditioned brooder-house under thermostatically controlled electric brooders on 6 months old built-up litter in an extremely dry environment. From 6 to 10 weeks they were finished in used and not especially disinfected fattening cages in an air-conditioned room also in a dry environment.

The first experiment of only 6 weeks duration gave—the control set at 100%—the following results:

Group I (Arsenical + Terramycin) = 119%
Group II (Arsenical alone) = 112%
Group III (Terramycin alone) = 105%

The second experiment gave the following results after the first 6 weeks:

Group I (Arsenical + Terramycin) = 127%
Group II (Arsenical alone) = 120%
Group III (Terramycin alone) = 112%

The final weights at the end of the second experiment (10 weeks) gave the following results:

Group I (Arsenical + Terramycin) = males: 117%, females: 121%
Group II (Arsenical alone) = males: 109%, females: 112%
Group III (Terramycin alone) = males: 102%, females: 107%

Under the conditions of these experiments the different supplements did not improve feed efficiency.—*Author's summ.*

ELAM, J. F., R. L. JACOBS, and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)
UNIDENTIFIED FACTOR FOUND IN AUTOCLAVED LITTER. *Poultry Sci. 33:* 1053-1054. 1954. (Nutrition Abstracts and Reviews)

ELLINGER, G. M. (Rowett Res. Inst., Bucksburn, Aberdeenshire.)
THE EVALUATION OF LEAF PROTEIN CONCENTRATES IN POULTRY RATIONS. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 128-130. (Nutrition Abstracts and Reviews)

FANGAUF, R. (Lehr-Versuchsanst. Kleintierzucht, Kiel, Steenbek.) (English and French summaries.)
DIE ANWENDUNG VON OLKUCHEN-EXTRAKTIONSSCHROTEN IM KUKENFUTTER. [USE OF EXTRACTED OILCAKE MEAL IN CHICK RATIONS.] *Arch. Geflügelk. 18:* 237-241. 1954.—Eight-week experiments on day-old chicks showed that waste meals from coconut, palm kernel and earthnut were as valuable as soya bean extracted meal, when used in the proportion of 8 per cent. in a ration which contained 8 per cent. of cod fishmeal. The results obtained with rape-seed meal were somewhat doubtful, and when 8 per cent. of linseed or cottonseed meal was given, the experiments had to be discontinued after 4 weeks, because of the severe losses of birds. A table is given showing the maximum quantities of vegetable protein substances recommended for the rations of chicks and laying hens.—*M. B. Richards.* (Nutrition Abstracts and Reviews)

FANGAUF, R., and G. v. BARLOWEN. (Lehr- Versuchsanst. Kleintierzucht, Kiel, Steenbek.) (English summary)
MOHNSAATMEHL IM KUKENFUTTER. [POPPY SEED MEAL IN CHICK RATIONS.] *Arch. Geflügelk. 18:* 205-207. 1954.—Three groups each of 30 New Hampshire day-old chicks were given a normal mixed ration including 15 per cent. oatmeal, or 10 per cent. oatmeal and 5 per cent. poppy seed meal or 5 per cent. oatmeal and 10 per cent. poppy seed. The poppy seed meal contained per cent.: water 5.42, crude protein 17.63, ether extract 42.42, crude fibre 8.80, N-free extract 18.43 and ash 7.30. Free fatty acids were estimated at 4.97 per cent. as oleic acid. The results at 4 weeks were: without poppy seed, feed consumed 460.3 g.; bodyweight 238.9 g.; total nutrients, g. per 100 g. increase, 158; with 5 per cent. poppy meal, in the same order, 430.8 g., 223.6 g. and 167; with 10 per cent. poppy meal 431.8, 217.9 and 180. The difference in rate of growth arose only in the fourth week and there was no obvious harm done by either the fatty acids or the opium in the poppy seed meal.—*I. Leitch.* (Nutrition Abstracts and Reviews)

FANGAUF, R., and G. v. BARLOWEN. (Lehr- Versuchsanst. Kleintierzucht, Kiel, Steenbek.) (English summary)
DORSCHEBERMEHL IM KUKENFUTTER. [COD LIVER MEAL IN CHICK RATIONS.] *Arch. Geflügelk. 18:* 203-205. 1954.—Cod liver meal is used less in Germany than in some other countries because of its price. Some of it is of poor quality and when it contains much free fatty acid it may be poisonous to poultry. A sample of such meal contained 25.5 to 28.3 per cent. crude fat and 13 to 14 per cent. free fatty acids. Two groups of 30 New Hampshire day-old chicks were given a normal mixed ration with 5 per cent. of liver meal of low fat content or of that described above. At the age of 4 weeks the chicks had eaten 414.3 g. (high fat) or 481.1 g. (low fat) food; weighed 187.1 g. and 244.8 g., and ate, per 100 g. weight increase, 198 g. or 164 g.—*I. Leitch.* (Nutrition Abstracts and Reviews)

FERGUSON, T. M., and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)
THE EFFECT OF VITAMIN B_{12} ON EMBRYONIC DEVELOPMENT OF THE CHICK. *Poultry Sci. 33:* 1054. 1954. (Nutrition Abstracts and Reviews)

FISHER, H., H. M. SCOTT, and B. C. JOHNSON. (Illinois Agric. Exp. Stat., Urbana.)
QUANTITATIVE ASPECTS OF THE NIACIN-TRYPTOPHAN RELATIONSHIP IN THE CHICK. *Poultry Sci. 33:* 1054-1055. 1954. (Nutrition Abstracts and Reviews)

FISHER, H., and H. M. SCOTT. (Dept. Animal Sci., Illinois Agric. Exp. Stat., Urbana.)
THE ESSENTIAL AMINO ACID REQUIREMENTS OF CHICKS AS RELATED TO THEIR PROPORTIONAL OCCURRENCE IN THE FAT-FREE CARCASS. *Arch. Biochem. Biophys. 51:* 517-519. 1954.—From data reported elsewhere in the literature, for many of the essential amino-acids the requirement of the chick as a percentage of its ration *(y)* and its concentration in the body as a percentage of a 4-week-old carcase *(x)*, closely fit the equation

$$y = 0.256 - 0.034x + 0.027x^2.$$

The usually accepted figures for methionine and lysine are not in agreement with this, but for each a figure has been reported by other workers which is in close agreement. The only other amino-acid which is off the curve to a greater extent than could be explained by possible experimental error is phenylalanine, but there is some confusion about the activity of the D-isomer present in the samples used to obtain the original data.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

FOX, T. W., and B. B. BOHREN. (Purdue Univ., Lafayette, Ind.)
AN ANALYSIS OF FEED EFFICIENCY AMONG BREEDS OF CHICKENS AND ITS RELATIONSHIP TO RATE OF GROWTH. *Poultry Sci 33:* 549-561. 1954.—In each of a series of 4 trials, 4 breeds of chicks were caged individually from 4 weeks of age and fed on a commercial broiler ration for 6 weeks; altogether 384 birds were used.

The New Hampshire birds had the heaviest mean finishing weight and also the highest feed conversion efficiency, 0.351; the White Leghorns were the lighest and had the lowest feed conversion efficiency, 0.297; the Dark Cornish and Dominant Whites were intermediate. Within each breed the males were heavier than the females and also had the higher efficiency of feed conversion; finally, regression analyses for each breed and sex showed a close positive correlation between feed conversion efficiency and average bodyweight over the experimental period.

On the basis of these and further statistical analyses it is concluded that there is little justification for breeders of birds intended for meat production to practice selection on the basis of economy in feed conversion in addition to the simpler criterion of rapid early growth.—*K. P. Carpenter.* (Nutrition Abstracts and Reviews)

GERRY, R. W., and J. R. SMYTH. (Maine Agric. Exp. Stat., Orono.)
THE VALUE OF FEATHER MEAL IN RATIONS FOR POULTRY. *Poultry Sci. 33:* 1089. 1954. (Nutrition Abstracts and Reviews)

GORREZ, DANILO D. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)
THE FEEDING VALUE OF "CONO" AND OF "KISKIS" RICE BRAN IN RATIONS FOR GROWING CHICKS. *Philippine Agriculturist 38:* 614-618. 1955.—The birds fed the "Cono" rice bran were heavier than those fed "Kiskis" rice bran and they needed less feed to produce a kilogram weanling weight. The average percentage of mortality was 24.1 for the "Cono" lot and 29.3 for the "Kiskis" lot. The results show that the feeding value of "Kiskis" rice bran is very much inferior to that of the "Cono" rice bran.—*F. M. Fronda.*

GRATTAROLA, M. M., and L. BRANCO. 1954. (1st Zootec. Casear. Piemonte, Turin.) (English summary)

AZIONE DEGLI ESTROGENI NATURALI E SINTETICI E DELLA VITAMINA E SULLE GALLINE DEPONITRICI. [THE EFFECT OF NATURAL AND SYNTHETIC OESTROGENS AND OF VITAMIN E ON LAYING HENS.] *Ann. Sper. agr.*, N.S., *8:* 1257-1264.—Egg production during 18 wks. of 2 groups of 11 White Leghorn hens, injected with 1 mg. folliculin and 1 mg. stilboestrol + vitamin E resp. per bird per week, was 497 and 454 eggs *v.* 407 in 11 controls. Egg production in a similar group receiving vitamin E alone was 449 eggs. (Animal Breeding Abstracts)

GRIMINGER, P., R. M. FORBES, and H. M. SCOTT. (Illinois Agric. Exp. Stat., Urbana.)

STUDIES ON THE METHIONINE REQUIREMENT OF THE CHICK. *Poultry Sci. 33:* 1047. 1954. (Nutrition Abstracts and Reviews)

GRAU, C. R., E. ALLEN, M. NAGUMO, C. L. WORONICK, and P. A. ZWEIGART. (Dept. Poultry Husb., Univ. California, Davis.)

A DISTINCTIVE YOLK COMPONENT IN THE FRESH EGGS OF HENS FED GOSSYPOL. *J. Agric. Food Chem. 2:* 982-986. 1954.—Laying hens given cottonseed meal frequently produce eggs with discolored yolks. A study has been made of the pigment apparently responsible for some of this discoloration by comparing the absorption spectra of hexane:acetone (3:1 by volume) extracts of the yolks of eggs from hens fed on diets containing cottonseed meal or pure gossypol with those from hens fed on a standard stock diet. The absorption at 400 mμ. was related quantitatively to the level of gossypol in the diet. The absorption spectra of eggs obtained from hens given cottonseed meal or pure gossypol were qualitatively similar.

It is suggested that the estimation of this yellow component of eggs will serve as a measure of the amount of biologically active gossypol in the diet.—*D. H. Shrimpton.* (Nutrition Abstracts and Reviews)

HARMS, R. H., and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)

THE EFFECT OF DIETARY SUPPLEMENTS ON THE STORAGE OF VITAMIN A IN CHICK LIVERS. *Poultry Sci. 33:* 1089. 1954. (Nutrition Abstracts and Reviews)

HAUSER, M. M., G. W. ANDERSON, W. F. PEPPER, and S. J. SLINGER. (Ontario Agric. Coll., Guelph.)

FURTHER EVIDENCE ON THE RELATION OF COLIFORMS TO THE GROWTH RESPONSE OF CHICKS TO ANTIBIOTICS. *Poultry Sci. 33:* 1058. 1954. (Nutrition Abstracts and Reviews)

HEYWANG, B. W. (Agric. Res. Serv., U.S. Dept. Agric., Glendale, Ariz.)

HIGH LEVELS OF ANTIBIOTICS IN THE DIETS OF LAYING CHICKENS. *Poultry Sci. 33:* 1059. 1954. (Nutrition Abstracts and Reviews)

HEYWANG, B. W., and H. R. BIRD. (Agric. Res. Serv., U.S. Dept. Agric., Bur. Animal Indust., Glendale, Ariz.)

EGG PRODUCTION, DIET CONSUMPTION, AND LIVE WEIGHT IN RELATION TO THE FREE GOSSYPOL CONTENT OF THE DIET. *Poultry Sci. 33:* 851-854. 1954.—Seven groups of 25 White Leghorn pullets were fed on all-vegetable rations containing 25 per cent. soya bean meal and yellow maizemeal in which raw decorticated cottonseed meal was included to give contents of "free" gossypol ranging from 0.008 to 0.033 per cent. In a second experiment, 9 groups of 25 White Leghorn pullets were fed on similar rations, but with solvent-extracted cottonseed meal included in place of some of the soya bean meal to give contents of free gossypol ranging from 0.008 to 0.020 per cent. In both experiments, the average total egg production per

pullet was greater in groups fed on rations containing up to 0.012 per cent. "free" gossypol than in groups fed on the control ration. Egg production and feed consumption were adversely affected when the diets contained 0.020 per cent. of "free" gossypol or more, but there was no effect on the weights of the pullets.—*D. Shrimpton.* (Nutrition Abstracts and Reviews)

HILL, C. H., and J. W. KELLY. (Dept. Poultry Sci., N. Carolina State Coll., Raleigh.)

THE EFFECT OF FISH MEAL ON THE RESPONSE OF CHICKS TO HIGH LEVELS OF PENICILLIN. *Poultry Sci. 33:* 657-658. 1954.—Six groups, each of 30 chicks, were fed from day-old to 4 weeks of age in battery cages where the room and equipment had recently been cleaned, steamed and fumigated.

The control ration consisted of soya bean meal 47, methionine 0.3, minerals 4.5, vitamins, and maizemeal to 100. The groups that received this ration alone or supplemented with 9 or 90 p.p.m. of procaine penicillin finished with mean weights of 404, 385 and 398 g. Parallel groups receiving similar rations, but with 5 per cent. of fishmeal, added at the expense of soya bean meal and maizemeal so as to keep the total protein content of the diets constant, finished with mean weights of 389, 398 and 420 g., respectively.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

HILL, F. W., L. C. NORRIS, and M. L. SCOTT. (Cornell Univ., Ithaca, N.Y.)

THE RIBOFLAVIN REQUIREMENT OF SINGLE COMB WHITE LEGHORNS FOR REPRODUCTION. *Poultry Sci. 33:* 1059. 1954. (Nutrition Abstracts and Reviews)

HOIE, J., and A. SANDVIK. (Norges Landbrukshogskole.) (English summary)

FORSOK MED KOKTE POTETER, POTETSURFOR OG POTETGROPP TIL VERPEHONER. [EXPERIMENTS WITH COOKED POTATOES, POTATO SILAGE AND POTATO MEAL FOR LAYING HENS.] *Meld. Norges Landbrukshogsk. 34:* 81-129. 1954.—Experiments were made with duplicate groups each of 40 or 42 pullets in the 3 years 1949-51 with steamed potatoes, silage of steamed potatoes and silage from raw potatoes, and in 1951 with single groups of 25 pullets with silage of raw potatoes steamed before use and pulped raw potatoes dried in a herringmeal drier. The controls had daily 40 to 50 g. whole grain, 50 g. sour skimmed milk and a mixture of cereal meal, extracted oilseed meal, herringmeal, grassmeal, yeast, cod liver oil and minerals, to appetite. The experimental groups received about 33 g. potato dry matter daily with about 20 g. whole grain, 50 g. sour skimmed milk and a still richer concentrate mixture to appetite.

Egg production was slightly higher in the controls than in any of the potato groups and less in the group with silage of raw potatoes than in the others. When the data for feed consumption were computed to the same liveweight and egg production, the value of potatoes for hens was estimated to be, in terms of Scandinavian feed units per 100 kg. potato dry matter: steamed 90, silage from steamed potatoes 92, silage from raw potatoes 57, steamed silage from raw potatoes 76 and dried potatoes 89.—*I. Leitch.* (Nutrition Abstracts and Reviews)

JENKINS, K. J., J. M. BELL, J. B. O'NEIL, and J. W. T. SPINKS. (Dept. Animal Husb., Univ. Saskatchewan, Saskatoon)

THE EFFECTS OF ANTIBIOTICS ON THE SYNTHESIS OF VITAMIN B_{12} IN THE CHICK. *Canad. J. Biochem. Physiol. 32:* 628-635. 1954.—A diet lacking vitamin B_{12}, with or without addition of radio-active cobalt as $^{60}CoCO_3$, was given to chicks having penicillin, streptomycin, aureomycin, terramycin or no supplement. Co alone did not affect weight gains but gains were increased when Co and an antibiotic were given. Aureomycin and terramycin appeared superior to penicillin and streptomycin. The excretion of Co rose and that of vitamin B_{12} fell in chicks receiving antibiotics. Estimation of Co and vita-

min B_{12} at all levels of the gastro-intestinal tract and in tissues showed that synthesis of vitamin B_{12} began in the proventriculus and that the rate and site of synthesis were affected by the antibiotics. The amount of Co in the tissues was higher when no antibiotic was given. The vitamin B_{12} content of all tissues, except the blood and gall bladder which showed high values, was little affected by administration of antibiotics. It is suggested that in chicks given no antibiotic the high values found in the blood and gall bladder were a sign of defective utilization of the vitamin.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

JOHNSON, E. A. (Poultrymen's Cooperative Assoc. S. California, Los Angeles.)
PROTEIN AND CALCIUM INTAKE ON A FREE-CHOICE DIET. *Poultry Sci. 33:* 1063. 1954. (Nutrition Abstracts and Reviews)

JOHNSON, E. L. (Univ. Minnesota, St. Paul.)
GROWTH PROMOTING PROPERTIES OF DEHYDRATED FISH SOLUBLES IN RELATION TO TIME OF REARING YOUNG STOCK. *Poultry Sci. 33:* 1063. 1954. (Nutrition Abstracts and Reviews)

JONES, H. L., G. F. COMBS, and G. L. ROMOSER. (Dept. Poultry Husb., Univ. Maryland, College Park.)
THE PRESENCE OF UNIDENTIFIED CHICK GROWTH FACTOR ACTIVITY IN DRIED WHEY PREPARED WITH A MINIMUM OF BACTERIAL FERMENTATION. *Poultry Sci. 33:* 930-932. 1954.—In a chick growth trial the basal diet was of α-soya bean protein 23, L-arginine hydrochloride 0.2, L-cystine 1.0, L-leucine 0.15, DL-lysine hydrochloride 0.5, DL-methionine 0.4, DL-tryptophan 0.1, L-tyrosine 0.3, iodinated casein (containing 1 per cent. of thyroxine) 0.03, maize oil 3.0, minerals 6.0, all the known crystalline vitamins and sucrose to 100. Two groups, each of 14 chicks, that received this ration alone from 1 to 4 weeks of age had mean weight gains of 164 and 174 g., respectively. Three further groups that received this ration supplemented with 3, 6 and 9 per cent. of a commercial dried whey product, containing 50 per cent. of lactose, gained 189, 193 and 185 g., respectively.

Further groups that received 3 and 6 per cent., respectively, of a special casein whey, prepared from pasteurized whole milk, after acid-precipitation of the casein, without opportunity for fermentation, gained 199 and 195 g.

It is concluded that the property possessed by commercial wheys of stimulating chick growth under these conditions is present in the original material and not the result of a fermentation process.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

KALLAI, L., B. ÁROS, F. BISKUP, and U. P. KRALOVANSZKY.
VITAMIN B_{12} IN EGG PRODUCTION AND HATCHABILITY. (B_{12} VITAMIN A TOJASTERMELESBEN ES A KELTHETOSEGBEN.) *Allattenyesztes. Budapest.* 1954. 249-255. *Hungarian Agricultural Review IV:* 16.

The authors examined the influence of Hungarian cobalamin-containing products on the egg production of geese and ducks kept on large-scale farms. Besides, the increasing number of eggs laid during the laying season, they also observed a more favorable variability as a result of the effect of the administered product.

The influence of vitamin B_{12} on hatchability was proved by the hatching results of hen-eggs injected with a solution of cobalamin. The authors established that vitamin B_{12} is effective only injected in the yolk and that in order to attain the desired hatching results, 5-10 micrograms of vitamin B_{12} are necessary.

KLAIN, G. J., D. C. HILL, and S. J. SLINGER. (Ontario Agric. Coll., Guelph, Canada.)
SUPPLEMENTATION OF POULT DIETS WITH LYSINE. *Poultry Sci. 33:* 1280-1282. 1954.— Broad-Breasted Bronze poults were fed starters containing 28.8%, 25.5% and 21.8% protein, with a constant

methionine level. Highest average weight at 4 weeks was obtained with the 28.8% starter. Supplementation of the 21.8% starter with lysine increased the average weight to a value about equal to that obtained with the 25.5% starter, and prevented the development of the white feather syndrome. There was no evidence of a lysine deficiency among poults fed the latter, and supplementation with lysine was ineffective. —*D. C. Hill.* (Biological Abstracts)

KLUSSENDORF, R. C. (Comm. Solvents Corp., Terra Haute, Ind.)
ANTIBIOTICS IN POULTRY FEED AND WATER-USE AND MISUSE. *Jour. Amer. Vet. Med. Assoc. 125:* 155-157. 1954.—Penicillin (2-4 g/ton of feed) and chlorotetracycline, bacitracin, and oxytetracycline (10 g/ton) have become established as additions with an expected increased efficiency of food utilization of 5-15% at a cost of $0.70-1.00/ton. Penicillin appears to be the most effective and economical. Medication of poultry is best done through the feed and higher levels are sometimes employed in disease control without experimental evidence of usfulness. Water medication is employed when feed consumption (containing antibiotic) is decreased. The practical value of antibiotics is dependent on their economical usage.—*J. F. Ryff.* (Biological Abstracts)

KRATZER, F. H., P. N. DAVIS, D. E. WILLIAMS, and B. J. MARSHALL.
(Dept. Poultry Husb., Univ. California, Davis.)
FACTORS INFLUENCING THE GROWTH OF CHICKS AND POULTS FED RATIONS CONTAINING RAPESEED OIL MEAL. *J. Nutrition 53:* 407-418. 1954.—In preliminary trials the growth of chicks was found to be only 80 to 90 per cent. that of control birds when from 10 to 30 per cent. of soya bean oilmeal was replaced by rapeseed oilmeal in a good starter ration. No improvement of growth was obtained when either a water-treated meal was used, or when 37 p.p.m. pyridoxine were added to the experimental rations.

In view of a reported goitrogenic effect of rapeseed oilmeals (Abst. 742, Vol. 18) a study was made of the effect of adding up to 300 mg. per kg. of "Protamone," a thyroid-active preparation, to a practical ration containing 30 per cent. of rapeseed oilmeal. These additions had no effect on the growth of chicks, but reduced their thyroid mass from 16 to approximately 7 mg. per 100 g. bodyweight. The addition of 50 mg. potassium iodide per kg. ration had no effect on thyroid weight.

In further chick trails on a purified ration (Abst. 3486, Vol. 17) in which rapeseed oilmeal was the sole source of protein, the mean percentage daily gain ranged from 4.7 to 6.5 compared with gains of 6.2 to 7.9 for control chicks receiving a standard mash. The addition of a supplement containing lysine, arginine, cystine and tryptophan to the experimental ration had a small, but inconsistent, growth-stimulating effect. It was concluded that rapeseed oilmeal is itself an adequate source of amino-acids for the growing chicks.

Chicks receiving a ration of rapeseed oilmeal 26, fishmeal 2.5, dried whey 2, alfalfa meal 2.5, wheat bran 5, aureomycin, mineral and vitamin supplements and cereals to 100 had a mean daily gain of 5.4 per cent. of their bodyweight. With a combined supplement of L-lysine 0.2, DL-methionine 0.1 and "Protamone" 0.01, the mean daily gain was 5.95 per cent. With only one or two of these additions the growth rate was intermediate between these values.

Poults receiving a similar basal ration, but with higher protein content, showed a mean daily gain in 22 days of 6.3 per cent. Other birds receiving this ration supplemented with 0.2 per cent. L-lysine had a daily gain of 6.7 per cent. The further addition of methionine and "Protamone" had only a small effect on growth. Poults receiving a standard mash had a daily gain of 7.3 per cent. There was a high incidence of "white-barred" feathers in the birds receiving rapeseed oilmeal without added lysine.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

KUDO, K., and I. ISOGAI. (Okazaki Livestock Breeding Stat., Minist. Agric. and Forest, Japan.)
THE EFFECTS OF FEEDING COOKED FISH OFFALS AND SUPPLEMENTING WITH ANTIBIOTICS ON THE GROWTH OF CHICKS. *10th World's Poultry Congr. Sect. Papers*, Edinburgh 1954, 136-138. (Nutrition Abstracts and Reviews)

LA GRUTTA, G., and A. CILENTO. (Ist Fisiol., Univ. Palermo.)
AZIONE DELLA VITAMINA B_{12} SUL BERI-BERI SPERIMENTALE DEL COLOMBO. [EFFECT OF VITAMIN B_{12} ON EXPERIMENTAL BERIBERI IN PIGEONS.] *Bol. Soc. ital. Biol. sper. 30:* 51-54. 1954.—Eight young pigeons weighing about 360 g. were given a diet of polished rice till signs of beriberi appeared. The amount of rice consumed was recorded, and the beriberi quotient of Amantea (Abst. 4092, Vol. 3) was calculated. The birds were then cured with a single injection of 5 mg. vitamin B_1, and fed on maize until the weight lost was regained. The experiment was then repeated with a daily intramuscular injection of 30 μg. vitamin B_{12}, and again, after a second cure, without the vitamin. There was no significant difference between the 3 sets of results.—*E. M. Hume.* (Nutrition Abstracts and Reviews)

LAKSESVELA, B. (Norwegian Herring Oil and Meal Indust. Res. Inst., Bergen.)
UNIDENTIFIED CHICK GROWTH FACTOR IN HERRING MEAL AND SOLUBLES. *10th World's Poultry Congr. Sect. Papers*, Edinburgh 1954, 154-157. (Nutrition Abstracts and Reviews)

LAUGHLAND, D. H. (Chem. Div., Sci. Serv., Canada Dept. Agric.)
THE BIOSYNTHESIS OF ^{14}C-β-CAROTENE AND ITS USE IN METABOLIC STUDIES WITH CHICKENS. *10th World's Poultry Congr. Sect. Papers*, Edinburgh, 1954, 157-160. (Nutrition Abstracts and Reviews)

LEROY, A. M., and J. DELAGE. (Inst. Nat. Agronom.)
L'ALIMENTATION DE LA POULE PONDEUSE. [THE FEEDING OF THE LAYING FOWL.] *Ann. Nutrit. Alimentation 8:* 209-238 (with discussion 239-245). 1954. (Nutrition Abstracts and Reviews)

LEROY, A. M., and G. LERY. (Lab. Recherches Zootech., Inst., Nat. Agronom., Paris.)
COMPARAISON DE LA DISTRIBUTION DU FACTEUR VITAMINIQUE A SOUS FORME D'AXEROPHTOL ET SOUS FORME DE CAROTENE POUR LA SATISFACTION DES BESOINS DES VOLAILLES. [DISTRIBUTION OF VITAMIN A AS AXEROPHTHOL OR CAROTENE TO MEET THE REQUIREMENTS OF FOWLS.] *Ann. Zootech. 2:* No. 2, 149-157. 1953.—In following years two successive batches of hens were used to study the allowance of carotene or vitamin A necessary for survival, laying, and satisfactory hatching of eggs. In the first batch heavy mortality was not prevented by 5000 I.U. of carotene or vitamin A, but a greater number of eggs was laid with vitamin A than with carotene. For the second batch of hens vitamin A was raised to 10,000 I.U. and carotene to 20,000 I.U., and no death occurred. Egg laying was now the same with both supplements. The vitamin A content per egg from hens given carotene and vitamin A, respectively, was 520 and 715 I.U. in the first batch and 608 and 743 I.U. in the second batch. Hatching trials in the second batch gave only 8 and 24 per cent. of eggs hatched from hens given carotene and vitamin A, respectively. When vitamin E as wheat germ was given in addition to the other supplements, the percentage of eggs hatched was raised to 32 and 39, which showed that deficiency of vitamin E could obscure the favorable action of carotene or vitamin A. It is recommended that laying hens weighing about 2 kg. should be allowed at least 360 μg. vitamin A or 1800 μg. carotene per head daily. Vitamin A is best supplied as fish liver oil and vitamin E as wheat germ oil.—*T. Moore.* (Nutrition Abstracts and Reviews)

LINDBLAD, G. S., AITKEN, J. R., and W. G. HUNSAKER. (Central Exp. Farm, Ottawa, Ont.)
STUDIES ON THE USE OF BARLEY IN CHICK RATIONS. *Poultry Sci. 33:* 1067. 1954. (Nutrition Abstracts and Reviews)

LINDGREN, N. O. (State Vet. Med. Inst. Stockholm.) (German and Swedish summaries)
STUDIES IN THE GROWTH PROMOTING ACTION OF ANTIBIOTICS IN POULTRY NUTRITION. 3. *Nord. Vet.-Med. 6:* 701-706. 1954.—A group of 60 White Leghorn cockerels was kept in a wire-floored cage from hatching to 4 weeks of age and fed on a ration of fishmeal 7.5, meatmeal 3.5, oilseed meals 13, wheat germ 0.5, alfalfa meal 3, a vitamin concentrate (rich in vitamins A and D and in riboflavin) 5, cod liver oil 1, minerals 1.5, wheat bran 24, yellow maize-meal 15, and dredge maize to 100. Their mean finishing weight was 238 g.

A second group received the same diet with a dietary supplement of *Bacterium coli* as previously used *(Proc. 15th Internat. Vet. Congr.,* 1953, 913) and finished with a mean weight of 228 g. Further groups that received, respectively, 5 p.p.m. procaine penicillin, penicillin and *Bact. coli,* and 5 p.p.m. neomycin and *Bact. coli,* weighed 246, 255 and 254 g. The failure to obtain a growth stimulus with a dietary supplement of *Bact. coli* alone is in disagreement with the author's earlier findings.

Serial samples of droppings and of crop contents were taken from the birds in the different groups, and serial dilution, plating and counting methods were used to measure their content of coliform organisms. The day-to-day variations were extremely high and the counts bore no obvious relation to the diets.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

LUCKEY, T. D., J. R. PLEASANTS, and J. A. REYNIERS. (Lobund Inst. Res. Life Sci., Univ. Notre Dame, Ind.)
VITAMIN INTERRELATIONSHIPS IN GERMFREE CHICKS. *Poultry Sci. 33:* 1068. 1954. (Nutrition Abstracts and Reviews)

McDONALD, M. W. (Poultry Expt. Stat., Seven Hills, N.S.W.), **and G. L. McCLYMONT.** (Vet. Research Station, Glenfield, N.S.W.)
STUDIES ON NUTRITION OF POULTRY. 4. NUTRITIONAL VALUE OF CONDENSED WHALE SOLUBLES IN CHICKEN RATIONS. *Australian Vet. Jour. 30:* 57-60. 1954.—The protein in condensed whale solubles was found to be as good as that in meatmeal when used in diets based largely on wheat, or wheat and peanut protein. Condensed whale solubles were found to be deficient in vit. B complex as compared with meatmeal, lucerne meal, and whey powder.—*P. R. Frey.* (Biological Abstracts)

McNALLY, E. H. (Agric. Res. Serv., U.S. Dept. Agric., Beltsville, Md.)
OBSERVATIONS ON THE USE OF FATS IN THE FINISHING DIETS OF FRYERS. *Poultry Sci. 33:* 1071. 1954. (Nutrition Abstracts and Reviews)

MARCH, B. E., and J. BIELY. (Univ. British Columbia, Vancouver 8.)
THE NUTRITIVE VALUE OF FATS OF DIFFERENT ORIGIN IN CHICK STARTERS. *Poultry Sci. 33:* 1069. 1954. (Nutrition Abstracts and Reviews)

MARCH, B. E., J. BIELY, and H. L. A. TARR. (Poultry Nutrit. Lab., Univ. British Columbia.)
THE NUTRITIVE VALUE OF FISH MEAL AND CONDENSED FISH SOLUBLES. 8. INTERACTION BETWEEN UNIDENTIFIED FACTORS IN HERRING MEAL AND IN DEHYDRATED GREEN FEED. *Fish. Res. Board Canada, Progr. Rep. Pacific Coast Stat.,* 1954, No. 99, 12-13.—In 2 chick growth trials the basal ration used consisted of "Drackett" protein 25, DL-methionine 0.4, ground cellulose 2, maize oil 3, minerals, vitamins, including the folic acid and vitamin

B_{12}, and cerelose to 100. After 1 week on the basal ration the chicks were allotted to experimental treatments. Those that continued to receive the unsupplemented ration in the 2 trials, which differed only in detail, finished with a mean weight of 370 g. at 32 days of age. Parallel groups receiving the same ration supplemented with 2 per cent. herringmeal and 5 per cent. "dehydrated green feed" were 15 per cent. heavier at this age.

There was no consistent growth stimulation in groups receiving either of these supplements alone. In a replication of one trial with the addition of ascorbic acid to all the rations no clear or consistent effect of this addition was seen.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

MATTERSON, L. D., F. A. RYAN, A. KOZEFF, and L. M. POTTER. (Univ. Connecticut, Storrs.)
THE EFFECT OF VITAMIN B_{12} ON BROILER YIELD AND FINISH. *Poultry Sci. 33:* 1069. 1954. (Nutrition Abstracts and Reviews)

MEADE, ALBERT R. (U. Arizona, Tucson.)
THE ECONOMIC SIGNIFICANCE OF USING GIANT AFRICAN SNAIL MEAL AS A POULTRY FEED. *Amer. Malacol. Union Ann. Rept. 6:* 5-6. 1953.—One expensive and important item in balanced feeds is animal protein which is abundantly on hand and free for the taking in snail infested areas. The author suggests that these snails can be reduced from abundant to scarce and the snail would not then exist as a problem. A localized plan for harvesting them could be set up on a rotation basis so that sufficient "seed" would remain. *Achatina fulica* feeds largely on unwanted decaying and rotting substances which it converts into high grade proteinaceous material.—*J. F. Allen.* (Biological Abstracts)

MEHRING, ARNON L. JR., HARRY W. TITUS (Lime Crest Res. Lab., Limestone Products Corp. of Amer., Newton, N.J.), and **J. WADDELL.** (Biol. Lab., E. I. du Pont de Nemours and Co., Inc., New Brunswick, N.J.)
THE EFFECT OF ADDING METHIONINE AND VITAMIN B_{12}, SINGLY AND TOGETHER, TO A CORN-SOYBEAN DIET FOR LAYING CHICKENS. *Poultry Sci. 33:* 1191-1196. Illus. 1954.—DL-methionine (0.0847%) and 9 μg of vitamin B_{12}/lb. of feed were added singly and together to an all-vegetable (corn-soybean) diet fed to laying hens in batteries. These supplements produced no statistically significant effects on egg production, the quantity of feed required to produce a dozen eggs, or the gain in live weight. Both the methionine and vitamin B_{12} had independent and additive beneficial effects on hatchability. The effect of the vitamin B_{12} was greater than that of the methionine.—*A. L. Mehring, Jr.* (Biological Abstracts)

MELLEN, W. J., and E. F. WALLER. (U. Delaware, Newark.)
ANTIBIOTICS AND THYROID SIZE IN GROWING CHICKENS. *Poultry Sci. 33:* 1036-1037. 1954.—Random samples of 10 8-week-old New Hampshire males were drawn from each of 8 lots representing duplicate pens on the following treatments: (1) control, (2) Aureomycin at 75 g/ton of feed, (3) bacitracin at 100 g/ton, and (4) furazolidone at 100 g/ton. Mean body weights and mean weights of thyroid pairs for the 4 treatment groups were, respectively: (1) 771 g, 51.9 mg; (2) 795 g, 66.2 mg; (3) 803 g, 60.8 mg; (4) 874 g, 64.7 mg. Considering relative body size among the groups, it appears that Aureomycin, in particular, significantly increased thyroid size. These results indicate a need for study of effects of antibiotics on thyroid function.—*W. J. Mellen.* (Biological Abstracts)

MILLER, E. C., M. L. SUNDE, H. R. BIRD, and C. A. ELVEHJEM. (U. Wisconsin, Madison.)
THE ISOLEUCINE REQUIREMENT OF THE LAYING HEN. *Poultry Sci. 33:* 1201-1209. 1954.—Single Comb White Leghorn pullets

were kept in laying cages with raised wire floors and fed a practical ration. Diet was formulated to contain 16% protein and consisted of wheat, corn, wheat bran, alfalfa leaf meal, blood meal, minerals, vitamins, and amino acids. The L-isoleucine content of the diet was 0.33% determined by microbiological assay. A preliminary experiment showed that this low isoleucine diet would support normal egg production when supplemented with DL-isoleucine. The practical diet was supplemented with crystalline isoleucine and the hens received the following levels of L-isoleucine, 0.33%, 0.38%, 0.43%, 0.53%. Maintenance of body weight, egg production and hatchability were determined for each group. Performance of chicks hatched from these diets was also determined. The results of 2 experiments indicate that approximately 0.53% L-isoleucine is required in the diet to support normal egg production and maintain body weight.—*Auth. summ.* (Biological Abstracts)

MILNE, F. N. J.

THE VALUE OF MAIZE IN POULTRY FEEDING. *Queensland Agric. J. 79:* 113-118. 1954.—Experiments with day-old Australorp chicks showed that an all-mash starter ration containing up to 40 per cent. maize produced satisfactory weight gains up to 7 weeks of age. With rations containing a higher percentage, up to 70 per cent., the weight at 7 weeks was too low.

From 7 to 24 weeks of age up to 70 per cent. maize in an all-mash ration was satisfactory.

All-mash laying rations for pullets in their first year of egg production were satisfactory when they contained 55, 62.5 and 70 per cent. maize. For hens in their second year of production 62.5 per cent. maize was the maximum permissible for satisfactory production.

When 30 per cent. or more maize is included in the ration manganese sulphate must be added.— *T. D. Bell.* (Nutrition Abstracts and Reviews)

MILNE, F. N. J. (Div. Animal Indust.)

THE EFFECT OF BENZENE HEXACHLORIDE IN POULTRY FEED ON MEAT AND EGG QUALITY. *Queensland J. Agric. Sci. 10:* 214-221. 1953.—Cockerels, 12 weeks of age, were divided into groups, housed on sawdust litter and fed on a good commercial mash without supplement (Group 1) or with supplements of a commercial form of benzene hexachloride (BHC) containing 12.5 per cent. of the active γ-isomer, contributing 5 p.p.m. (Group 2) and 25 p.p.m. (Group 3). Further groups (4 and 5) received supplements of a deodorized BHC preparation containing 99 per cent. of the isomer; this was sprayed on the feed so as again to contribute 5 and 25 p.p.m., respectively, of the γ-isomer.

Birds were slaughtered and cooked for tasting tests at frequent intervals after the fifth week of the trial. After 11 weeks the flesh of birds from group 2 was inedible, and by 13 weeks that of group 3 was definitely tainted, the subcutaneous fat being the most affected. No off-flavor was recorded for birds from groups 4 and 5 even after 24 weeks of the deodorized BHC.

Similar experimental treatments were given to 5 groups of laying pullets. After 20 weeks of the experiments off-flavors were found consistently in the eggs from each of the groups receiving BHC, when the groups receiving deodorized BHC were only beginning to show this effect; eggs from groups 2 and 3 were tainted after only 6 to 8 weeks of receiving the commercial BHC.

It is concluded that BHC is not a suitable insecticide for use with grain destined for poultry feeding.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

MONSON, W. J., E. A. HARPER, D. A. BENTON, and C. A. ELVEHJEM. (Dept. Biochem., Coll. Agric., Univ. Wisconsin, Madison.)

THE EFFECT OF LEVEL OF DIETARY PROTEIN ON THE GROWTH OF CHICKS FED PURIFIED DIETS CONTAINING SUCROSE OR DEXTRIN. *J. Nutrition 53:* 563-573. 1954.—In a series of 8 trials chicks were fed from hatching to 4 weeks of age on a

basal ration of alcohol-extracted casein 18, gelatin 10, soya bean oil 5, salts 6, L-cystine 0.5, fortified halibut liver oil, all the crystalline vitamins and sucrose to 100. These chicks finished with a general mean weight of about 330 g.; the mean in single trials ranged from 266 to 351 g. Parallel groups that received the same ration with dextrin in place of sucrose in 5 of the trials were about 30 g. heavier. This increase could be obtained also, though not with complete consistency, by increasing the casein content of the "sucrose" ration to 22 or 25 per cent. No further increase was obtained by increasing the protein content of the ration containing dextrin.

In further trials in which 2.5 mg. bacitracin and 10 mg. penicillin were added to each 100 g. of ration, 18 per cent. casein with sucrose gave as good growth as rations of higher protein content or containing dextrin. Growth on the basal ration also was improved by the addition of 10 per cent. of either fibrin or wheat gluten.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

MOORE, E. N. (Ohio Agric. Expt. Sta., Wooster, Ohio.)
SAFETY OF ARSANILIC ACID FOR TURKEY BREEDERS. *Poultry Sci. 33:* 1115-1116. 1954.—Indications are that turkeys tolerate high levels of arsanilic acid (2 lbs./ton, which is about 10 times the recommended level) and maintain fertility. Adverse effects were shown after a period of 2 weeks in hatchability and egg production.—*E. N. Moore.* (Biological Abstracts)

MOREHOUSE, N. F. (Dr. Salsbury's Labs., Charles City, Iowa.)
THE EFFECT OF 3-NITRO-4-HYDROXYPHENYLARSONIC ACID ON REPRODUCTION IN LAYING HENS. *Poultry Sci. 33:* 1072-1073. 1954. (Nutrition Abstracts and Reviews)

MORGAN, C. L., and C. P. WILLIMON. (Poultry Dept., S. Carolina Agric. Exp. Stat., Clemson.)
COTTONSEED MEAL PREPARED BY DIFFERENT METHODS FOR BROILER RATIONS. *Poultry Sci. 33:* 528-532. 1954.—The 3 cottonseed meals used were a screw-press meal, 42 per cent. protein and 3.6 per cent. fat, a gossypol-free solvent meal, 41 per cent. protein and 1.6 per cent. fat, and a hydraulic meal, 41.6 per cent. protein and 8.3 per cent. fat; the control soya bean meal was a solvent-extracted product, 45.6 per cent. protein and 1.0 per cent. fat. The basal rations contained 21 per cent. protein and were of maize and oilmeal with 2 per cent. fishmeal and 2 per cent. dried whey, minerals and vitamins. The rations were given for 10 weeks to duplicate groups of 20 day-old New Hampshire chicks in wire-floored batteries. Substitution for about half the soya bean meal of any of the cottonseed meals did not affect growth. Only the gossypol-free cottonseed meal when given as the main source of protein produced growth equal to soya bean meal alone; the other 2 cottonseed meals gave significantly poorer growth. Mortality was not related to the ration. The feed efficiency of birds receiving cottonseed meals was satisfactory but not so high as that of birds receiving only soya bean meal.—*M. J. Head.* (Nutrition Abstracts and Reviews)

MORIMOTO, H., S. ARIYOSHI, and H. HOSHII. (Nat. Inst. Agric. Sci., Chiba-shi, Japan.)
EFFECT OF ARGININE, GLYCINE, METHIONINE AND VITAMIN B_{12} ON CHICK GROWTH. *10th World's Poultry Congr. Sect. Papers,* Edinburgh, 1954, 142-144. (Nutrition Abstracts and Reviews)

MOTZOK, I., D. ARTHUR, and H. D. BRANION. (Ontario Agric. Coll., Guelph.)
UTILIZATION OF PHOSPHORUS FROM VARIOUS PHOSPHATE SUPPLEMENTS BY CHICKS. *Poultry Sci. 33:* 1073. 1954. (Nutrition Abstracts and Reviews)

MULLER, W. (Swiss Federal Institute of Technology, Zurich.)
THE APPLICABILITY OF INDICATOR METHODS TO DIGES-

TION EXPERIMENTS WITH POULTRY. [DIE BRAUCHBARKEIT VON INDIKATORMETHODEN BEI VERDAUUNGSVERSUCHEN MIT GEFLUGEL.] Thesis 1953.—In experiments with poultry barium-sulphate, chromic oxyde and lignin were tested as indicators for digestibility determinations.

Bariumsulphate was abandoned after a preliminary trial because of analytical difficulties.

Chromic oxyde was excreted at a constant level already from the second day after its application. With *young cockerels* the chromic oxyde content of the excretia voided at daytime was 0.62% higher than at night, if the indicator was added to a coarsely ground feed; addition of the chromic oxyde to a finely ground mash or binding it physically to the feed by baking gave 0.34 to 0.42% higher chromic oxyde excretion during the day. *Grown-up animals* in the contrary excreted 0.26 to 0.54% more chromic oxyde at night than at daytime. In order to avoid errors due to this difference in the excretion of the indicator it is necessary to collect an aliquot sample of the total 24-hour excretion for determining digestibility in poultry by the chromic oxyde method.

With lignin results of digestion experiments with poultry showed a great variability, probably due principally to errors in lignin determinaton by the method of *Ellis*. Differences in the concentration of the 72% sulfuric acid from —1% to +2.15% resulted in digestion coefficients for the seemingly indigestible lignin ranging from —4.0 to 25.3.

$$\text{The equation } D_c - D_f = \frac{L_f \ (100 - D_c)}{100 - L_f}$$

has been derived which expresses the relation between digestion coefficients determined according to the conventional method (D_c) and the indicator method (D_f), and the percentage of ingested indicator not recovered in the feces (L_f). In an example it is shown, that the error due to incomplete recovery of the indicator decreases with increasing digestibility of the diet.—*A. Schürch.*

NABER, E. C., C. A. BAUMANN, and H. R. BIRD. (Univ. Wisconsin, Madison.)

NUCLEIC ACIDS AS GROWTH FACTORS FOR THE FOLACIN DEFICIENT CHICK. *Poultry Sci. 33:* 1073-1074. 1954. (Nutrition Abstracts and Reviews)

NAIDOO, D., and O. E. PRATT. (Inst. Psychiat., Univ. London, Maudsley Hosp.)

THE ACTIVITY AND LOCALIZATION OF ADENOSINE 5¹-PHOSPHATASE IN THE THIAMINE DEFICIENT CHICKEN BRAIN. *Biochem. biophys. Acta. 15:* 291-292. 1954.—Adenosine-5¹-phosphatase activity was studied histologically, and estimated as described previously (*Enzymologia*, 1954, *16*, 289), in brains from normal chicks and chicks deprived of vitamin B_1. In the optic tectum and cerebral hemisphere from deprived chicks the fibres failed to stain, but the staining of the nuclei was strongly maintained. The phosphatase activity of the brains of normal chicks lay within the range from 18.1 to 20.6 "units"; that of deficient birds was from 22.7 to 26.0 "units." The findings suggested that adenosine-5¹-phosphatase is in some way involved in the reaction of brain tissue to vitamin B_1 deficiency.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

NATIONAL RESEARCH COUNCIL, U.S.A.

NUTRIENT REQUIREMENTS FOR DOMESTIC ANIMALS. 1. NUTRIENT REQUIREMENTS FOR POULTRY. Publ. No. 301, revised January 1954, pp. 27. Price $0.50.—This new edition adheres to the pattern previously used in these publications. Nutrient requirements are, however, now presented without any "margin of safety" to allow for loses during the preparation and storage of mixed rations. It is considered that individual manufacturers can best determine mar-

gins suitable for their own particular conditions.

Estimates for folic acid requirements have now been included. For starting chicks, laying hens and breeding hens these are 0.25, 0.11 and 0.16 mg., respectively, per lb. feed. In arriving at these estimates more account has been taken of experiments in which starch and not sucrose has formed the main dietary carbohydrate; with the latter, requirements are higher.

A tentative figure of 0.004 mg. per lb. is given as an allowance of vitamin B_{12} in a chick starting ration, but it is emphasized that the chick's requirement of this vitamin depends to a great extent on the diet received by the breeding flock, and on the other components of the chick ration.

Figures are also included for the amino-acid requirements of laying hens and for the total feed requirements of laying hens differing in bodyweight and level of egg production; for example, the daily requirement of a 4½-lb. bird laying 200 eggs per year is given as approximately 4 oz.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

OLSSON, N. (English summary)

UNDERSOKNINGAR RORANDE HONSENS KOKSALTBEHOV OCH DERAS REAKTION FOR OLIKA STORA KOKSALTMANGDER I FODRET. [STUDIES OF THE SALT REQUIREMENT OF POULTRY AND THEIR REACTION TO DIFFERENT AMOUNTS OF SALT IN THEIR FEED.] *Kgl. Lantbrukshögsk. Statens Husdjursförsök Medd.* No. 55, 1953, pp. 29.—Experiments made intermittently over a number of years are described. NaCl in amounts up to 1.6 per cent. of all-mash rations had no effect on the health or behavior of chicks except to increase the amount of water drunk and the water content of the droppings; 10 per cent. killed all the chicks. The full requirement was met with cereal rations by 0.2 to 0.8 per cent. NaCl; no salt should be added if much fishmeal or meatmeal is used. Laying hens require 0.5 to 1 per cent. of all-mash ration; the amount added must be adjusted for the use of fishmeal and a grain mixture as part of the feed.—*I. Leitch.* (Nutrition Abstracts and Reviews)

O'ROURKE, W. F., H. R. BIRD, P. H. PHILLIPS, and W. W. CRAVENS. (U. Wisconsin, Madison.)

THE EFFECT OF LOW PHOSPHORUS RATIONS ON EGG PRODUCTION AND HATCHABILITY. *Poultry Sci. 33:* 1117-1122. 1954.—Single Comb White Leghorn pullets were given a basal ration that contained 0.19% P. This ration did not support normal egg production and hatchability. When the basal ration was supplemented with $CaHPO_4.2H_2O$ to contain 0.30% P normal production and hatchability were maintained. This ration contained 0.18% nonphytin and 0.12% phytin P. The results indicate that the P requirement of laying pullets is considerably lower than supposed.—*W. F. O'Rourke.* (Biological Abstracts)

PADLAN, ROMANA R. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)

GERMINATED MUNGO MEAL AS A PROTEIN SUPPLEMENT IN A GROWING RATION FOR CHICKS. *Philippine Agriculturist 38:* 595-603. 1955.—Germinated mungo cannot replace even 5 parts of the fish meal constituent of the College chick ration. When, however, the supply of fish meal is low or when its price is too high or when mungo is plentiful and cheap, germinated mungo meal may economically replace 5 parts of fish meal.—*F. M. Fronda.*

PATTERSON, E. B., J. R. HUNT, P. VOHRA, L. G. BLAYLOCK, and J. McGINNIS. (State Coll. Washington, Pullman.)

NIACIN AND TRYPTOPHAN REQUIREMENTS OF CHICKS AND TURKEYS. *Poultry Sci. 33:* 1075-1076. 1954. (Nutrition Abstracts and Reviews)

PATRICK, H., and G. K. SCHWEITZER. (U. Tennessee, Knoxville.)
FACTORS ASSOCIATED WITH THE MOVEMENT OF CALCIUM FROM THE FOOD TO THE BONES OF CHICKS. *Poultry Sci. 33:* 1199-1201. 1954.—An organic factor, besides vitamin D, is associated with the movement of Ca from the blood stream to the bones. vitamin D influences absorption of Ca from the digestive system; whereas, the unrecognized organic factor influences Ca movement within the body. This unrecognized organic factor is water soluble, can be destroyed by dialysis and is present in casein, milk albumen, and soybean proteins.—*H. Patrick.* (Biological Abstracts)

PEPPER, W. F., M. M. HAUSER, G. W. ANDERSON, and S. J. SLINGER. (Ontario Agric. Coll., Guelph.)
EFFECT ON CHICK GROWTH AND FECAL FLORA OF "SWITCHING" FROM ONE ANTIBIOTIC TO ANOTHER. *Poultry Sci. 33:* 1089. 1954. (Nutrition Abstracts and Reviews)

PETERSON, D. W., E. A. SHNEOUR, and N. F. PEEK. (Dept. Poultry Husb., Coll. Agric., Univ. California, Berkeley.)
EFFECTS OF DIETARY STEROLS AND STEROL ESTERS ON PLASMA AND LIVER CHOLESTEROL IN THE CHICK. *J. Nutrition 53:* 451-459. 1954.—Male chicks were fed on a stock diet until they were 3 weeks old and were then transferred to diets containing 4 per cent. cottonseed oil and cholesteryl acetate, caprate, myristate, palmitate, stearate or oleate; each ester was incorporated in the diet at a level equivalent to 1 per cent. of cholesterol. Total plasma cholesterol was estimated weekly for 4 weeks, after which the animals were killed and liver cholesterol was estimated.

Cholesteryl esters produced lower plasma and liver cholesterol levels than did free cholesterol. Cholesteryl, ergosteryl and dihydrocholesteryl palmitates, when given together with cholesterol, did not prevent the increases in tissue cholesterol which occurred with the free sterols alone.

In similar experiments cholic acid, oleic acid or cottonseed oil given with cholesterol enhanced increases in plasma cholesterol values; these increases were prevented by the addition of mixed soya bean sterols to the diet.—*G. A. Garton.* (Nutrition Abstracts and Reviews)

PETERSON, D. W., and PHYLLIS A. ZWEIGART. (U. California, Berkeley.)
CORN OR BARLEY FOR LAYING HENS. *California Agric. 8:* 15-16. 1954.—Feeding trials indicated that barley was as efficient as corn, on a weight basis, in rations for laying hens. Relative costs would appear to be the chief factor influencing the choice of these grains in an all-mash ration.—*G. W. Bohn.* (Biological Abstracts)

POLIN, D., and P. D. STURKIE. (Rutgers Univ., New Brunswick, N.J.)
EFFECTS OF STARVATION ON DIFFUSIBLE AND NON-DIFFUSIBLE PLASMA CALCIUM IN THE FOWL. *Poultry Sci. 33:* 1077. 1954. (Nutrition Abstracts and Reviews)

POTTER, G. C., and F. A. KUMMEROW. (Dept. Food Technol., Univ. Illinois, Urbana.)
CHEMICAL SIMILARITY AND BIOLOGICAL ACTIVITY OF THE SAPONINS ISOLATED FROM ALFALFA AND SOYBEANS. *Science, 120:* 224-225. 1954.—Saponins extracted from alfalfa leaf meal were hydrolyzed and 3 genins were separated on an alumina column. A sample of soyasapogenol B was prepared by the method of *Ochiai et al. (Ber.,* 1937, *70*B, 2083) and from its infrared spectrum it appeared to be closely related to the first of the 3 alfalfa genins.

Purified saponins from both alfalfa and soya beans inhibited growth in chickens, but their genins did not. Part of the growth depression in chickens and the occurrence of bloat in cattle may be caused by soyasapogenols; with cooking these would be hydrolyzed to non-toxic genins. The process of dehydration is too mild to hydrolyze the saponins of alfalfa.—*D. Harvey.* (Nutrition Abstracts and Reviews)

PRICE, ROBERT, and C. A. BOTTORFF.
EFFECT OF 2-ACETAMIDO-5-NITROTHIAZOLE AND 2-AMINO-5-NITROTHIAZOLE ON EGG PRODUCTION, FERTILITY, HATCHABILITY, AND WEIGHT GAINS IN TURKEYS. *Poultry Sci. 33:* 952-957. 1954.—The compounds, 2-acetamido-5-nitrothiazole (Enheptin A) and 2-amino-5-nitrothiazole (enheptin), were administered to normal turkeys during the growing and/or breeding period using dosage schedules designed to approximate field use, and the effects on reproductive performance and weight gains were studied. Enheptin A, incorporatd in mash at levels of 0.025% and 0.0125%, was fed continuously from 11 to 43 weeks of age; enheptin, at levels of 0.1% and 0.05%, was fed continuously for 2 weeks at 17-19 weeks of age. A total of 228 hens were held in 12 pens, with 2 toms/pen, and each treatment level was fed to birds in each of 3 pens; 109 untreated hens were held in 6 pens, with 2 toms/pen, to serve as controls. In both treated and untreated birds, egg production began at 32 weeks of age. No significant differences between treated and control birds were found in egg production, hatchability, salable poults, weight gains, and feed consumption. Significant differences in fertility were detected between controls and 2 of the treatments—0.025% Enhepin A and 0.05% enheptin. However, these differences are of slight economic importance from a practical standpoint.—*R. J. Price.* (Biological Abstracts)

RAMSAY, W. N. M., and E. A. CAMPBELL. (Dept. Biochem., Univ. Edinburgh.)
IRON METABOLISM IN THE LAYING HEN. *Biochem. J. 58:* 313-317. 1954.—Plasma Fe and Hb were estimated in samples of blood taken at intervals of about 3 weeks from pullets before laying and throughout a laying season. Plasma Fe rose from below 250 μg. per 100 ml., 10 days before laying, to become 500 and 900 μg. per 100 ml. during egg production. High plasma Fe values were significantly correlated with high values for total egg Fe.
From analyses of liver, spleen and kidney it was concluded that the increased Fe requirement during egg laying was provided by increased efficiency of absorption rather than by depletion of tissues.—*R. Hill.* (Nutrition Abstracts and Reviews)

RANDLES, C. A. (JR.) (Oak Ridge Inst. Nuclear Studies, Ohio State Univ., Columbus.)
A STUDY OF PHOSPHATE DIFFUSION IN THE DEVELOPING EGG WITH RADIOACTIVE PHOSPHORUS^{32}. *Poultry Sci. 33:* 1077. 1954. (Nutrition Abstracts and Reviews)

REID, B. L., S. GABAY, and J. R. COUCH. (Texas Agric. and Mech. Coll. System, College Station.)
EFFECT OF METHIONINE, METHIONINE HYDROXY ANALOGUE AND VITAMIN B_{12} ON THE GLUTATHIONE LEVEL IN THE CHICK. *Poultry Sci. 33:* 1090. 1954. (Nutrition Abstracts and Reviews)

RINGROSE, R. C., L. M. POTTER, and R. M. HATCH. (Univ. New Hampshire, Durham.)
PROTEIN REQUIREMENTS OF MEAT TYPE NEW HAMPSHIRE PULLETS. *Poultry Sci. 33:* 1078. 1954. (Nutrition Abstracts and Reviews)

ROMOSER, G. L., G. F. COMBS, and J. L. NICHOLSON. (Univ. Maryland, College Park.)
EFFECT OF INSOLUBULE GRIT ON WEIGHT AND FEED EFFICIENCY OF BROILER CHICKENS. *Poultry Sci. 33:* 1078-1079. 1954. (Nutrition Abstracts and Reviews)

ROSENBERG, M. M. (Dept. Poultry Husb., Univ. Hawaii, Honolulu.)
A STUDY OF HIGH LEVELS OF CANEFINAL MOLASSES IN LAYING RATIONS. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 113-117. (Nutrition Abstracts and Reviews)

ROSS, E., G. H. STRITE, and H. YACOWITZ. (Ohio Agric. Exp. Stat., Wooster.)

COMPARISON OF FEED EFFICIENCY, WATER CONSUMPTION, DRY MATTER EXCRETION, AND OXYGEN CONSUMPTION BETWEEN SLOW AND RAPIDLY GROWING CHICKS. *Poultry Sci. 33:* 1079. 1954. (Nutrition Abstracts and Reviews)

RUNNELS, T. D. (Univ. Delaware, Newark.)

THE VALUE OF ANIMAL FAT IN COMBINATION WITH VARIOUS OTHER INGREDIENTS IN BROILER RATIONS. *Poultry Sci. 33:* 1090. 1954. (Nutrition Abstracts and Reviews)

SALINAS, FRANCISCO C. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)

FEEDING AUROFAC TO 12-WEEK-OLD PULLETS RANGE-REARED TO 24 WEEKS OF AGE. *Philippine Agriculturist 38:* 465-470. 1954.—The feeding value of the ration was markedly improved by the addition of 1 gram Aurofac to every 100 grams of the College rearing ration. The ration produced heavier pullets, less mortality, and cheaper cost of feed to produce a kilogram gain in weight than the control ration.—*F. M. Fronda.*

SANDOVAL, JOSE R. (University of the Philippines, College of Agriculture, College, Laguna, Philippines.)

THE INFLUENCE OF 5 AND 10 PARTS IPIL-IPIL LEAF MEAL IN THE COLLEGE LAYING MASH. *Philippine Agriculturist 38:* 574-582. 1955.—The addition of ipil-ipil *(Leucaena glauca* Linn.) leaf meal in the College all-mash ration did not increase egg production; it, however, reduced the amount of feed need to produce a dozen eggs. Increased ipil-ipil leaf meal intensified the color of the yolk but had no effect on the weight of the eggs.—*F. M. Fronda.*

SAXENA, H. C., G. E. BEARSE, C. F. McCLARY, L. G. BLAYLOCK, and L. R. BERG. (Dept. Poultry Sci., W. Washington Exp. Stat., Puyallup.)

DEFICIENCY OF FOLIC ACID IN RATIONS CONTAINING NATURAL FEEDSTUFFS. *Poultry Sci. 33:* 815-820. 1954.—Day-old crossbred chicks were given rations containing 78 per cent. maize from different sources or milo, with herringmeal as the source of supplementary protein. When the diet contained soya bean oilmeal in addition, growth was not affected by the type of grain used. When the diet contained herringmeal as sole protein supplement, growth with maize was inferior to that with milo, the chicks were poorly feathered and the incidence of perosis was high. The depression of growth with the rations containing herringmeal was corrected by a supplement of folic acid, 50 mμg. per 100 g., or by a percentage addition of brewer's yeast 2.3, liver meal 2.5, dehydrated grass 5.0, or soya bean oilmeal 8.3.—*E. M. Cruickshank.* (Nutrition Abstracts and Reviews)

SCHWEIZERISCHE GEFLUGELZUCHTSCHULE (Zollikofen, Bern, Switzerland.)

STUDIES ON THE INFLUENCE OF VITAMIN E UPON THE BEGIN OF LAYING, EGG PRODUCTION, EGG WEIGHT AND FERTILITY OF YOUNG HENS, AND ON HATCHABILITY OF THEIR PROGENY. [UNTERSUCHUNGEN UBER DEN EINFLUSS VON VITAMIN E AUF LEGEBEGINN, DIE LEGELEISTUNG, DAS EIGEWICHT UND DIE FRUCHTBARKEIT DER JUNGHENNEN SOWIE AUF DIE SCHLUPFFAHIGKEIT IHRER NACHZUCHT.] *XIX. Annual Report, Swiss Poultry Breeding School,* Zollikofen-Berne, 1954.—The addition of vitamin E to a normal diet for Leghorn chickens had no effect on the begin of laying, egg production and egg weights. The fertility of hens, the hatchability of eggs and the development of the progeny was not influenced either. The high vitamin E content of the natural diet, which exceeds the requirements by far, explain these results.—*A. Schürch.*

SCHWEIZERISCHE GEFLUGELZUCHTSCHULE (Zollikofen, Bern, Switzerland.)

EXPERIMENTS WITH ADSORBING AGENTS IN CHICKEN DIETS. [VERSUCH MIT ADSORBENTIEN ALS ZUSATZ ZU KUCKENMASTFUTTER]. *XIX. Annual Report, Swiss Poultry Breeding School*, Zollikofen-Berne, 1954.—180 chickens were alloted equally to three groups:

Group 1 (control): Basal diet (broiler mash)
Group 2: Basal diet + 1% charcoal and free access to charcoal. (total consumption 1.5%)
Group 3: Basal diet + 1% clay and free access to clay (total consumption 1.2%.

Gains and feed efficiency were not influenced by the treatments. However in the third experimental week in groups 2 and 3 feather picking could be observed which made treatment of the animals necessary. After 12 weeks when the broilers were ready for slaughtering the damage was evaluated by the following system:

Undamaged plumage	0 points
Irregular, loose plumage	1 point
Distinct bare spots	2 points
Large bare spots	3 points
Whole breast or back without feathers	4 points

According to this system the three groups averaged the following points:

	Breast	Back
Group 1	0	0
Group 2 (charcoal)	2.08	1.34
Group 3 (clay)	1.69	1.14

The possible reasons for this effect of adsorbing agents are discussed.—*A. Schürch.*

SCOTT, M. L., and G. F. HEUSER. (Dept. Poultry Husb., Cornell Univ., Ithaca, N.Y.)

STUDIES ON LEG WEAKNESS IN TURKEYS, DUCKS AND GEESE. *10th World's Poultry Congr. Sect. Papers*, Edinburgh 1954, 255-258. (Nutrition Abstracts and Reviews)

SHERWOOD, D. H., and T. T. MILBY. (Larro Res. Farm, Detroit, Mich.)

RESTRICTED VERSUS FULL-FEEDING FOR GROWING PULLETS. *Poultry Sci. 33:* 1080. 1954. (Nutrition Abstracts and Reviews)

SHERWOOD, D. H., and T. T. MILBY. (Larro Res. Farm., Detroit, Mich.)

FURTHER TESTS WITH ANTIBIOTICS FOR LAYING AND BREEDING HENS. *Poultry Sci. 33:* 1031-1033. 1954.—In a series of 6 laying trials under different systems of management and with a variety of practical rations the overall mean production from 750 birds, on a hen-day basis, was 54 per cent. The mean production from parallel groups receiving similar rations with the addition of one or more antibiotics was also 54 per cent. The use of antibiotics was without effect on mortality, efficiency of feed conversion or hatchability of fertile eggs. Both light and heavy birds were used, and the supplements, with their concentrations in the total ration in mg. per lb., were terramycin (5), aureomycin hydrochloride (6 and 50), terramycin and aureomycin mixed (11 and 18), and penicillin (2). In no case did a particular combination of feed, management and supplement give evidence of any response to the use of an antibiotic.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews

SHERWOOD, D. H., and H. J. SLOAN. (Dept. Poultry Husb., Univ. Minnesota, St. Paul.)

VITAMIN B_{12} AND CHOLINE IN CORN-SOY RATIONS FOR STARTING POULTS. *Poultry Sci. 33:* 1015-1021. 1954.—Day-old poults from turkey hens given a practical ration received for 4 weeks a basal all-vegetable diet low in choline, with or without supplements of vitamin

B_{12} alone or with nicotinic acid and choline or with methionine. The addition to the basal diet of 10 μg. vitamin B_{12} per kg. increased the growth rate significantly, but efficiency of feed utilization was not consistently improved. Supplements of vitamin B_{12} with choline or methionine still further increased growth and efficiency of feed utilization also. Mortality was excessive on the basal ration and much less when choline was added but only slightly less with vitamin B_{12}. Nicotinic acid had little effect on growth rate or mortality. There was some evidence that prolonged storage of the ration reduced the amount of available choline. When the basal diet was supplemented with choline, the severity of gizzard erosion and the size of the gizzard were less. —*E. M. Cruickshank.* (Nutrition Abstracts and Reviews)

SHIRLEY, R. L., J. C. DRIGGERS, J. T. McCALL, M. NIENBERG, and G. K. DAVIS. (Dept. Animal Husb., Univ. Florida Agric. Exp. Stat., Gainesville.)

THE RATE OF DEPOSITION AND TURNOVER OF P^{32} AND Ca^{45} IN THE TISSUES OF THE LAYING HEN. *Poultry Sci. 33:* 932-936. 1954.—Ten laying hens and 2 just out of production were injected in the gastrocnemius and breast muscles with 100 μC. of ^{32}P and 50 μC. of ^{45}Ca and were killed after 0.25, 0.5, 1, 2, 3, 8, 24, 96, 98, 240 and 504 hr.

In the bones, both elements reached a maximum concentration 1 to 3 hr. after administration, which remained constant to 240 hr. and then fell. Of the bones studied the pubis and atlas contained least isotope.

^{32}P reached a maximum concentration of 0.05 per cent. in the lungs, spleen, pancreas, brain and bile and slightly more in the heart. Within 2 hr. of the injection, the liver contained 17 per cent., and still 1 per cent. between 240 and 504 hr. The kidney contained a maximum of 6.5 per cent. after 3 hr. Muscles, magnum and uterus reached a maximum after 24 hr., ovaries at 96 hr., but no turnover was observed in the last during 21 days.

^{45}Ca was found in the non-osseous tissue at a very low level, only traces remaining after a few hours.

The daily excreta of the first 3 days contained 15, 7 and 4 per cent. of the ^{32}P dose and 2, 1 and 0.8 per cent. of the ^{45}Ca dose. Thereafter the excreta contained daily about 2.2 per cent. of the ^{32}P and 0.2 percent. of the ^{45}Ca.—*M. J. Head.* (Nutrition Abstracts and Reviews)

SHRIMPTON, D. H. (Rowett Res. Inst., Bucksburn, Aberdeenshire.)

THE RETENTION OF VITAMIN B_{12} BY THE CHICK RECEIVING ALL-VEGETABLE RATIONS. *Proc. Nutrition Soc. 13:* i-ii. 1954. (Nutrition Abstracts and Reviews)

SIMMONNET, H., LEBAAS, and H. HEIN DE BALSAC.

ROLE PHYSIOLOGIQUE DES CAECUMS DES OISEAUX DE BASSE-COUR. ELABORATION DE VITAMINE B_{12}. [THE PHYSIOLOGICAL ROLE OF CECUM OF FARMYARD BIRDS. PRODUCTION OF VITAMIN B_{12}.] *Compt. Rend. Acad. Agric. France 39:* 795-800. 1953.—A description of the occurance, structure and role of cecum is given. In chickens the vitamin B_{12} content of the cecum was 60 μg/1,000 μg fresh weight as compared with 3.0 μg fresh weight for intestinal matter. When the feed was supplemented with B_{12}, the B_{12} content of the cecum was doubled. Cobalt chloride supplement caused elevation of the B_{12} in the intestinal matter but not in the cecum.—*H. G. Koritz.* (Biological Abstracts)

SINGSEN, E. P., L. D. MATTERSON, A. KOZEFF, and L. D. STINSON. (Univ. Connecticut, Storrs.)

THE EFFECT OF FEEDING HIGH AND LOW EFFICIENCY RATIONS TO GROWING PULLETS ON THEIR SUBSEQUENT LAYING PERFORMANCE. *Poultry Sci. 33:* 1081. 1954. (Nutrition Abstracts and Reviews)

SIZEMORE, J. R., R. J. LILLIE, H. R. BIRD, and C. A. DENTON. (Agric. Res. Serv., U.S. Dept. Agric., Beltsville, Md.)

FURTHER STUDIES ON THE INFLUENCE OF AUREOMYCIN IN THE CHICK DIET UPON SUBSEQUENT REPRODUCTIVE PERFORMANCE OF LAYING HENS. *Poultry Sci. 33:* 1081. 1954. (Nutrition Abstracts and Reviews)

SLINGER, S. J., A. M. MORPHET, E. C. HUNT, and W. F. PEPPER. (Dept. Poultry Husb., Ontario Agric. Coll., Guelph.)

EFFECT OF PENICILLIN AND FORAGE JUICE ON REPRODUCTION AND GROWTH OF TURKEYS. *Poultry Sci. 33:* 944-951. 1954.—Thirty Broad Breasted Bronze turkeys in their first year of egg production were divided into 3 pens, each with a tom, and given a ration of fishmeal 2.25, dried buttermilk 1.25, meatmeal 1, soya bean meal 7.5, grassmeal 2.5, minerals 2.75, vitamins A, D_3 and B_{12}, riboflavin and cereals (wheat, oats, maize and barley) to 100. Over 16 weeks 1600 eggs were set from these birds and 68 per cent. of the fertile eggs hatched.

Parallel groups of birds received similar treatment, but with dietary supplements of either 1.5 mg. per lb. of procaine penicillin or 5 per cent. of forage juice, or both. Hatchability with these treatments was 72.8, 70.0 and 75.3 per cent., respectively. The supplements did not appear to influence either egg production, about 42 per cent. over the trial, or the number of infertile eggs, about 13 per cent. of the eggs laid. Daily feed consumption was 0.59 lb. in the control groups, and for the birds receiving the supplements 0.57, 0.60 and 0.57 lb., respectively.

Poults hatched from the breeding trial were then used in a growth experiment for which the basal diet was fishmeal 2, dried buttermilk 2, meatmeal 2, soya bean meal 43, soya bean oil 1, minerals 4, DL-methionine, vitamins A, D_3 and B_{12}, riboflavin, nicotinic acid and cereals (wheat, maize and oat groats) to 100. At 32 days of age poults receiving this ration unsupplemented had a mean weight of 600 g. Further analysis according to the diet of their dams showed means of 604 g. for the progeny of unsupplemented dams, and 579, 583 and 630 g. for the progeny of dams that had received penicillin, forage juice and penicillin plus forage juice, respectively. Other poults that received their ration supplemented with both penicillin and forage juice at the same level as in the breeding rations had a mean weight at 32 days of 750 g. Further analysis of this figure, according to the diet of their dams, as above, showed means of 729, 767, 732 and 767 g. for the progeny of control and supplemented dams, respectively. In other groups poults receiving either penicillin or forage juice alone grew at a rate intermediate between that of the control poults and that of those receiving both supplements. It is concluded that, with the type of basal rations used, both penicillin and forage juice are of value in improving breeding performance and the growth of the young; but that for the latter the supplement received by the poult is of more importance than that included in the ration of the dam.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

SMITH, A. H., C. M. WINGET, and J. R. BLACKARD. (Coll. Agric., Univ. California, Davis.)

THE TRANSFER OF PHOSPHORUS TO THE HEN'S EGG, UNDER CONTROLLED ENVIRONMENT, AS TRACED WITH RADIO PHOSPHORUS (P^{32}). *Poultry Sci. 33:* 908-919. 1954.—The conditions of this experiment were the same as in the previous Abst. At the beginning of each experiment each hen received intramuscularly 180 to 350 μC. of ^{32}P.

Less than 2 per cent. of the injected P appeared in the shell within 12 days unless an egg was laid soon after injection; 2 per cent. appeared in the shell of an egg laid 2 hr. after injection. The maximum amount of radio-activity always occurred in the first shell laid.

Less than 1 per cent. of the injected ^{32}P reached the white in the first 12 days and maximum activity was encountered in the second egg laid except when it was 3 or more days afterwards.

Of the injected dose 10.8 per cent. reached the yolk in the first 12 days and 4.2 per cent. in the next 12. Maximum activity was in the fourth or fifth egg, that of inorganic P preceding that of organic P by 38 hr.

Kinetic analysis of the rate of ^{32}P transference indicated the existence of 2 major P pools, one renewed every 1.4 days and holding 18 per cent. of the total P, and the other renewed in 14 days holding 82 per cent.—*M. J. Head.* (Nutrition Abstracts and Reviews)

SNYDER, J. M., W. D. MORRISON, and H. M. SCOTT. (Univ. Illinois, Urbana.)
A REVALUATION OF THE ARGININE REQUIREMENT OF THE CHICK FED A PURIFIED DIET. *Poultry Sci. 33:* 1082. 1954. (Nutrition Abstracts and Reviews)

SQUIBB, R. L., and others.
THE VALUE OF SWEETPOTATO AND ACHIOTE MEAL IN RATIONS FOR CHICKENS. *Turrialba 3:* 163-166. 1953.—In experiments carried out in Guatemala, corn was substituted by sweet potato and achiote *(Bixa orellana)* in poultry rations. Sweet potatoes substituted satisfactorily both half and all the corn in the basic ration for baby chicks (16 and 32% of the ration). Although a small decrease in growth was observed in the baby chicks fed the higher level, the difference was not statistically significant. Achiote meal can substitute from 30 to 50% of the corn in baby chicks rations. When all the corn was substituted, a decrease in the rate of growth was observed. In an experiment with laying hen, 3% of achiote meal in the ration increased the carotenoid content in the eggs and improved the yolk color. At the same time, the levels of carotenoids and vit. A content of the blood serum of the hens increased. The achiote meal remaining after the carotene and bixene were removed by extraction for the manufacture of these 2 concentrates was a good source of vit. A activity for poultry.—*J. K. Leasure.* (Biological Abstracts)

STEPHENSON, E. L. (Univ. Arkansas, Fayetteville.)
AMINO ACID SUPPLEMENTATION OF BROILER DIETS. *Poultry Sci. 33:* 1083. 1954. (Nutrition Abstracts and Reviews)

STEPHENSON, E. L., C. DICKSON, and B. D. BARNETTE. (Univ. Arkansas, Fayetteville.)
AN UNIDENTIFIED FORAGE JUICE FACTOR NECESSARY FOR OPTIMUM REPRODUCTION IN WHITE WYANDOTTE HENS. *Poultry Sci. 33:* 1083. 1954. (Nutrition Abstracts and Reviews)

STURKIE, P. D. (Lab. Avian Physiol., Rutgers Univ., New Brunswick, N.J.)
EFFECTS OF ACUTE THIAMINE DEFICIENCY ON THE ELECTROCARDIOGRAM OF THE CHICK. *Poultry Sci. 33:* 508-510. 1954.—Three groups of White Leghorn chicks, 2 and 12 days old, were given a synthetic diet without vitamin B_1. About 50 per cent. died within 15 days, and most of them were dead after 28 days. Heart abnormalities developed within from 7 to 10 days. Sinus arrhythmia appeared in the early stages of deficiency, and was followed by sinus arrest and bradycardia. The heart rate, normally from 250 to 300 beats per min., was reduced to from 90 to 100 in moribund chicks. Other abnormalities recorded were depression of the S-T segment, and occurrence of ectopic beats and A-V dissociation with nodal rhythm.—*E. M. Cruickshank.* (Nutrition Abstracts and Reviews)

SUNDE, M. L. (Univ. Wisconsin, Madison.)
THE EFFECTS OF FATS AND FATTY ACIDS ON FEED CONVERSION IN CHICKS. *Poultry Sci 33:* 1084. 1954. (Nutrition Abstracts and Reviews)

TARVER, F. R. (JR.), and H. PATRICK. (Univ. Tennessee, Knoxville.)
DEFICIENCIES IN COTTONSEED MEALS. *Poultry Sci. 33:* 1084. 1954. (Nutrition Abstracts and Reviews)

TARVER, F. R. (JR.), H. PATRICK, and O. E. GOFF. (Univ. Tennessee, Knoxville.)
INFLUENCE OF ARSENIC AND PENICILLIN ON DRESSING GRADES AND QUALITY OF POULTRY. *Poultry Sci. 33:* 1085. 1954. (Nutrition Abstracts and Reviews)

THOMANN, W. (Swiss Federal Institute of Technology, Zurich.)
DIGESTION EXPERIMENTS WITH MIXED CLOVER AND GRASS, AND WITH ALFALFA ON POULTRY. INFLUENCE OF GROWTH STAGE AND PROCESSING. [VERDAUUNGSVERSUCHE MIT KLEEGRAS UND LUZERNE BEIM HAUSHUHN. EINFLUSS DES WACHSTUMSSTADIUMS UND DER AUFARBEITUNG.] Thesis, 1952.—With 4 grown-up Rhode Island roosters the influence of drying, grinding and stage of growth on digestibility of mixed clover and grass, and of alfalfa was studied. *Drying* the clover and grass 2-2½ hours at 45 to 50° C. increased digestibility of protein significantly. *Grinding* dried alfalfa finely (1 mm mesh) resulted in an improvement of digestibility of protein and ether extract amounting to 7.4% and 12.9% resp. as compared to coarse grinding (4 mm mesh). Grinding alfalfa before drying improved digestibility of ether extract, crude fiber and nitrogen free extract significantly in comparison to the values found with alfalfa ground in the dried state. In this case however the digestibility of protein was lower.

From the experiments with alfalfa cut at *different stages of maturity* the following statistically significant equations could be derived:

Digestion coefficient of organic matter = 63.81 — 1.045 ×
Digestion coefficient of protein = 90.91 — 0.927 ×

in which × = crude fiber in % of dry matter (Studied range 19.6-36.2%).

Thus poultry has the same digestive capacity for protein and ether extract from green forage as ruminants but fails in digesting nitrogen free extract and crude fiber efficiently.

In a second chapter the direct methods of *Stotz*,[1] *Diakow*,[2] *Ekman*[3] and *Engler*[4] for separating feces and urine nitrogen are compared with the indirect method of *Engler*.[5] The first three methods appeared to give more accurate results than the two methods by *Engler*, the method of *Stotz* giving always the highest and the method of *Diakow* the lowest values for feces nitrogen.—*A. Schürch.*

1. H. Stotz: Archiv f. Tierernährung u. Tierzucht *9*, 426-437, 1933.
2. M. J. Diakow: Arch. F. Tiererng. u. Tierzucht *7*, 571-633, 1932.
3. P. Ekman: Proc. 8th World's Poultry Congress 1948, p. 220-225.
4. H. Engler: Die Tierernährg. *5*, 329-371, 1933; see also H. E. Woodman: J. Agric. Sci. *14*, 413-427, 1924.
5. H. Engler: Die Tierernährg. *5*, 329-371, 1933; see also H. W. Titus: Poultry Sci. *7*, 145, 1928.

THOMPSON, R. Q., O. D. BIRD, and F. E. PETERSON. (Res. Labs., Parke, Davis and Co., Detroit, Mich.)
THE UTILIZATION OF PANTETHINE AS COMPARED TO CALCIUM PANTOTHENATE BY THE CHICK. *J. Nutrition 53:* 365-375. 1954.—The biological potency for chicks of the *Lactobacillus bulgaricus* factor, pantethine, was compared with that of calcium pantothenate given in the diet, or directly by mouth or by intraperitoneal injection. Pantethine had about 90 per cent. of the potency of pantothenate given orally but was equally potent given parenterally. Pantetheine, which is a reduced form of pantethine, and the mercury mercaptide of pantetheine were as potent as pantethine if given directly by mouth or by injection.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

THOMPSON, R. Q., and O. D. BIRD. (Res. Labs., Parke, Davis and Co., Detroit, Mich.)
IN VIVO ACTIVITY OF PANTOTHENYLCYST(E)INE FOR RATS AND CHICKS. *Science, 120:* 763-764. 1954.—In view of reports

that pantothenylcysteine had growth-promoting activity for certain microorganisms, it was tested on young chicks and rats given diets lacking in pantothenic acid. Whether given with the diet or injected it failed to promote growth in chicks or rats deprived of pantothenic acid.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

TRENCHI, H., and G. F. HEUSER. (Lab. Biol. Animal, Pondo, Canelones, Uruquay.) (English and German summaries)
ULTIMAS CONQUSTAS EN LA CIENCIA DEL LA ALIMENTACION DE LAS AVES. [RECENT SCIENTIFIC DISCOVERIES IN POULTRY NUTRITION.] *Zootechnia 3:* 157-163. 1954.—A review without references. (Nutrition Abstracts and Reviews)

TRIBE, D. E. (Sch. Vet. Sci., Univ. Bristol.)
OBSERVATIONS ON THE FEEDING BEHAVIOR OF RATS AND CHICKS DEFICIENT IN VITAMIN E. *J. Hyg. 52:* 315-320. 1954.—For 56 days, rats were offered daily in two pots a diet deficient in vitamin E. At the end of the time one of the pots was filled with a diet containing an adequate amount of vitamin E. Vitamin E deficiency was confirmed by the dialuric acid haemolysis test. The rats showed no preference for the adequate diet; the weekly selections from the two pots showed precisely the same pattern in the second period as in the first.

In a second experiment with chicks the development of encephalomalacia was used as criterion of vitamin E deficiency, and a similar result was obtained.—*R. J. Ward.* (Nutrition Abstracts and Reviews)

TYLER, C. (Dept. Agric. Chem., Univ. Reading.)
STUDIES ON EGG SHELLS. 4. THE SITE OF DEPOSITION OF RADIOACTIVE CALCIUM AND PHOSPHORUS. *J. Sci. Food Agric. 5:* 335-339. 1954.—Two laying pullets were fed on a diet of normal composition with part of the Ca in radio-active form. The total Ca required for egg production was included in the mash and the whole daily allowance of mash was consumed between 9:30 and 11:00 a.m. each day. For 7 days the time was noted at which each egg was laid. Collection of eggs was continued for a further 7 days after radioactive Ca was discontinued.

Autoradiographs of shell sections were prepared from each egg laid and by comparing the patterns of radio-activity of eggs laid at different times it was possible to suggest which part of each shell was formed from dietary and which from bone Ca.

Most eggs were laid during the morning, and with only one feed daily, the shells of these eggs were formed in the early stages from food Ca and later from bone Ca. Shells of eggs laid after about 3:30 p.m. contained food Ca in the outer parts, showing that by this time food Ca consumed between 9:30 and 11:00 a.m. was available in the shell gland.

The experiment was repeated with radio-active P. Most of the small amount of P associated with the shells was on or near the surface.—*R. Hill.* (Nutrition Abstracts and Reviews)

TYLER, C., and F. H. GEAKE. (Dept. Agric. Chem., Univ. Reading.)
STUDIES ON EGG SHELLS. 5. SOME PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE EGG SHELLS OF FIVE DIFFERENT TYPES OF PHEASANT. *J. Sci. Food Agric. 5:* 612-619. 1954.—Egg shells from 5 types of pheasants, 4 reared in captivity and the other trapped before laying, were examined for shell thickness, porosity coefficients, pore counts, membrane-, pore- and matrix-protein, citric acid, carbonate, Ca, Mg and P. There were considerable differences between the types, with the wild type usually at one or other end of the range. Equations relating shell weight to Ca content and carbonate to Ca content were similar to those from hen egg shells (Abst. 3494, Vol. 24) but the relation between shell thickness and weight per unit area was different.—*A. Hepburn.* (Nutrition Abstracts and Reviews)

TYLER, C. (Dept. Agric. Chem., Univ. Reading.)
A FURTHER STUDY OF THE EFFECT OF SULPHANILAMIDE ON THE METABOLISM OF CALCIUM AND PHOSPHORUS IN THE LAYING HEN. *J. Agric. Sci. 45:* 156-163. 1954.—As an extension of earlier work (Abst. 1208, Vol. 21) a calcium and phosphorus balance experiment was made with 6 pullets for 10 consecutive periods each of 8 days. In the second and third periods each bird received a daily supplement of either 0.036 or 0.072 g. sulphanilamide.

The sulphanilamide appeared to have no significant effect on the number of eggs laid by the birds either immediately or in the next 8 months. The daily ration contributed 2.75 g. Ca and 1.06 g. P, and in the preliminary period the birds were all in positive balance or equilibrium for both minerals. At the time of, and for 5 weeks after, receiving sulphanilamide Ca retention was reduced. During sulphanilamide feeding the eggs laid were thinner shelled so that the balance was little affected. Afterwards shell thickness returned rapidly to normal, so that for several weeks the birds were in negative Ca balance as a result of persisting impairment of retention.

Statistical analyses were made in an attempt to relate individual differences in Ca retention to the level of egg production, and to concurrent changes in P metabolism.—*K. P. Carpenter.* (Nutrition Abstracts and Reviews

URI, D., Z. BEN-ADAM, and E. YIZHAKI. (Poultry Sect., Dept. Animal Husb., Minist. Agric., Israel.)
CAROBS IN POULTRY NUTRITION. *10th World's Poultry Congr. Sect. Papers,* Edinburgh 1954, 117-119. (Nutrition Abstracts and Reviews

VIJAYARAGHAVAN, P. K., and B. S. RAO NARASINGA. (Nutrit. Res. Labs., Indian Counc. Med. Res., Coonoor, S. India.)
THE INFLUENCE OF DUCK EGG WHITE (DEW) OVOMUCOID ON THE LIBERATION OF ESSENTIAL AMINO ACIDS FROM DIFFERENT PROTEINS BY TRYPSIN *IN VITRO. Indian J. Med. Res. 42:* 373-379. 1954.—Solutions of casein, wheat gluten, Bengal gram globulin, coagulated hen egg white and autoclaved duck egg white in phosphate buffer were digested with trypsin, and the effect of duck ovomucoid on the release of total amino-N and essential amino-acids was estimated after 24 and 120 hr.

The release of total amino-N was significantly inhibited and was least from casein and wheat gluten. The release of amino-acids, in particular histidine, lysine and threonine, was also inhibited with every protein, most with Bengal gram globulin and least with casein.

The antitryptic activity of the ovomucoids from duck and hen on casein was about the same, but after 24 hr. the activity of hen ovomucoid was much less than that of duck ovomucoid and after 120 hr. it had disappeared.

The growth-depressing action of duck ovomucoid was attributed to a possible block in the supply of essential amino-acids for formation of tissue protein.—*A. Hepburn.* (Nutrition Abstracts and Reviews)

VUKINA, R., and F. ZELENKO. (English summary)
UTJECAJ KRMNIH SMJESA NA RAZVITAK TEZINE, EKONOMIKU ISHRANE I RENTABILITET PROIZVODNJE PILICA. [INFLUENCE OF DIFFERENT FEED MIXTURES ON WEIGHT INCREASE, ECONOMY OF FEEDING AND PROFITABLE PRODUCTION OF CHICKENS.] *Veterinaria 1:* 56-80. 1953.—An experimental study of the feeding value of different mashes.—*S. Pribicevic* (Jugoslavia). (Nutrition Abstracts and Reviews)

WAIBEL, P. E., A. B. MORRISON, and L. C. NORRIS. (Cornell Univ., Ithaca, N.Y.)
PRODUCTION OF DEPLETED CHICKS BY FEEDING MATERNAL DIETS DEFICIENT IN UNIDENTIFIED GROWTH FACTORS. *Poultry Sci. 33:* 1085. 1954. (Nutrition Abstracts and Reviews)

WELCH, B. E., and J. R. COUCH. (Dept. Poultry Husb., Texas Agric. Exp. Stat., College Station.)

VITAMIN B_{12} AND SUB-OPTIMAL LEVELS OF PANTOTHENIC ACID IN CHICK NUTRITION. *Proc. Soc. Exp. Biol. Med. 87:* 121-123. 1954.—In day-old chicks which received for 4 weeks a basal diet containing, per kg., 10.5 mg. pantothenic acid, and supplemented with 1.66 mg. pantothenic acid, growth was decreased by supplements of 50 μg. vitamin B_{12} per kg. With increase in the amount of vitamin B_{12} growth was further reduced and signs of pantothenic acid deficiency became progressively more pronounced. When the supplements of pantothenic acid were increased to 3.32 and 6.64 mg. per kg. diet growth improved and the signs of deficiency disappeared. Further additions of pantothenic acid were without effect. Addition of vitamin B_{12} up to 100 μg. per kg. diet progressively increased the vitamin B_{12} content of the liver, and it was still further increased by adding pantothenic acid, 3.32 and 6.64 mg. per kg. diet. The results suggested a sparing effect on vitamin B_{12} of pantothenic acid. The pantothenic acid content of the liver was increased only when supplements of 6.64 mg. or more of pantothenic acid per kg. diet were given.—*E. M. Cruickshank.* (Nutrition Abstracts and Reviews)

WEST, J. W. (Mississippi State Coll., State College.)

COTTONSEED OIL MEAL AS A SUBSTITUTE FOR SOYBEAN OIL MEAL IN POULTRY RATIONS. *Poultry Sci. 33:* 1086. 1954. (Nutrition Abstracts and Reviews)

WILCOX, R. A., C. W. CARLSON, W. KOHLMEYER, and G. F. GASTLER. (Dept. Poultry Husb., S. Dakota Agric. Exp. Stat., College Station.)

THE AVAILABILITY OF PHOSPHORUS FROM DIFFERENT SOURCES FOR POULTS FED PURIFIED DIETS. *Poultry Sci. 33:* 1010-1014. 1954.—In each of 5 experiments, 10 groups of 20 to 22 day-old poults were given a synthetic ration with 0.06 per cent. P for 4 weeks. The following P supplements were given at 0.8 and 1.0 per cent. levels: (1) dibasic Ca phosphate U.S.P., (2) monobasic Ca phosphate, (3) tribasic Ca phosphate, (4) β tricalcium phosphate, (5) steamed bonemeal, (6) (7) and (8) different defluorinated calcium phosphates, (9) and (10) different commercial dicalcium phosphates, (11) and (12) different rock phosphates, (13), (14) and (15) different colloidal phosphates. $CaCO_3$ was used to balance the supplementary P.

Supplements 1, 2, 7 and 8 were the most suitable and 11, 12, 13, 14 and 15 were unsuitable; the remainder were intermediate. It is not known why there was such a large variation in the usefulness of the same product from different sources.—*M. J. Head.* (Nutrition Abstracts and Reviews)

WILGUS, H. S., and I. L. MADSEN. (Colorado Agric. Exp. Stat., Fort Collins.)

THE EFFECT OF ALFALFA MEAL ON EARLY GROWTH OF CHICKS. *Poultry Sci. 33:* 448-459. 1954.—In this experiment groups of 25 New Hampshire chicks were given the experimental rations at 2 weeks of age for 4 weeks. In general, a high-energy maize and soya bean oilmeal ration was used as a basal feed. A difference of 10 per cent. in group chick weights was considered significant.

The effect on growth rate of 100 different samples of alfalfa meal was determined when it was included in the ration at a 10 per cent. level. The history of nearly all samples was known and nearly all came within the 17 per cent. protein class. Three samples of sun-cured meal depressed growth rate to below 70 per cent. of the control; 20 per cent. of the meals depressed growth more than 10 per cent. and a further 27 per cent. depressed growth by less than 10 per cent.; the remainder, 53 per cent., had no effect. The average growth rate when the 3 sun-cured meals were included was 92 per cent. of that of the control group, and 93.5 per cent. for the 100 dehydrated meals. The chick growth rates with each cutting relative to the control group were 94.5 for the first cut, 94 for the second, 90 for the third, 95.5 for the fourth and

99.5 per cent. for the fifth. There was no relation between growth depression and digestibility. The meals giving the greatest growth depression were low in carotene. It was not believed that the slight differences in mineral content of the meals had any effect on their value for growth; nor was it considered that the depression of growth was due to the fibre content, since a slightly greater amount of cellulose fibre had no ill effect. The possible effects of weed contaminants or residues of spray chemicals were eliminated. Fine grinding compared with grinding to a granular consistency increased the growth-depressing effect of the meal, but this could be obviated by damping the fine meal with molasses. It was found that the growth-depressing substance was destroyed to a considerable extent by prolonged soaking in hot water, but it was resistant to autoclaving at 150°C. for 20 min. and was insoluble in acetone.—*M. J. Head.* (Nutrition Abstracts and Reviews)

WILSON, P. N. (Wye Coll., Univ. London.)
GROWTH ANALYSIS OF THE DOMESTIC FOWL. I. EFFECT OF PLANE OF NUTRITION AND SEX ON LIVE-WEIGHTS AND EXTERNAL MEASUREMENTS. 2. EFFECT OF PLANE OF NUTRITION ON CARCASS COMPOSITION. 3. EFFECT OF PLANE OF NUTRITION ON CARCASS COMPOSITION OF COCKERELS AND EGG YIELDS OF PULLETS. *J. Agric. Sci 42:* 369-381. 1952; *44:* 67-85. 1954; *45:* 110-124. 1954.—1. Chicks of a Rhode Island Red-Light Sussex cross were reared to 10 weeks on either a high or a low plane of nutrition. In the former case they received to appetite a ration of dried milk 15, fishmeal 7, dried grass 5, linseed meal 3, middlings 20, maize 30, wheat 14, cod liver oil and minerals; and in the latter they received restricted quantities of a diet low in crude protein (13.9 per cent.) and made up of fishmeal 3, pea meal 9, dried grass 5, linseed meal 8, middlings 38, potato meal 23, maize 10, together with cod liver oil and minerals.

At 10 weeks of age each group was again divided into a high and a low sub-group with rations generally similar to those used in the first stage. In this way 4 differently shaped growth curves were obtained from the individual sub-groups.

2. Sample birds were killed from each sub-group at intervals up to 24 weeks of age, and the carcasses dissected. Of the organs weighed only the eyes and heart were unaffected at each age by the different treatments used. The organs of the endocrine and reproductive system were the most affected. There were significant differences in the proportions even of birds of the same weight that had been reared in different ways.

3. Retardation of tissue growth in the low plane group in the first 10 weeks was almost completely made up in the growing period by the sub-group that was then transferred to a high plane of nutrition. Extensive data are reported for organ and bone weights according to age and treatment.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

WORONICK, C. L., and C. R. GRAU. (Univ. California, Berkeley.)
EVIDENCE FOR A GOSSYPOL-CEPHALIN COMPOUND IN FRESH EGGS OF HENS FED COTTONSEED MEAL. *Poultry Sci. 33:* 1088. 1954. (Nutrition Abstracts and Reviews)

YACOWITZ, H., E. ROSS, T. S. CHANG, and A. R. WINTER. (Ohio State Wooster.)
FURTHER STUDIES ON THE SUPPLEMENTATION OF BROILER RATIONS WITH FATS. *Poultry Sci. 33:* 1090. 1954. (Nutrition Abstracts and Reviews)

YACOWITZ, H., E. ROSS, T. S. CHANG, and A. R. WINTER. (Ohio State Univ., Columbus.)
GROWTH STIMULATORY EFFECT OF 2, 3-DIPHENYL INDOLE IN CHICKS. *Poultry Sci. 33:* 1088. 1954. (Nutrition Abstracts and Reviews)

YOUNG, R. J., L. C. NORRIS, and G. F. HEUSER. (Agric. Exp. Stat., Cornell Univ., Ithaca, N.Y.)

THE UTILIZATION BY VITAMIN B_{12}-DEFICIENT CHICKS OF MONOMETHYLAMINOETHANOL, HOMOCYSTINE AND BETAINE AS PRECURSORS OF CHOLINE AND METHIONINE. *J. Nutrition 53:* 233-248. 1954.—Chicks from hens receiving a maize and soya bean meal diet were given diets based on soya bean protein and adequate in all amino-acids except methionine and cystine. A supplement of choline alone improved growth and survival, and choline with vitamin B_{12} was still better. Monomethylaminoethanol combined with betaine permitted good growth and survival with or without vitamin B_{12}; it was slightly more effective in replacing choline when the total methionine and cystine in the basal diet amounted to 0.75 instead of 0.55 per cent. Vitamin B_{12} did not seem to be essential to the process of transmethylation. A combination of homocystine and betaine also replaced methionine for chicks. If inadequate amounts of betaine were included in the mixture the presence of vitamin B_{12} was essential, which was evidence that the vitamin was concerned in the synthesis of methyl groups by the chick.—*A. M. Copping.* (Nutrition Abstracts and Reviews)

PATHOLOGY

BISWAL, G., and C. C. MORRILL. (U. Illinois, Urbana.)

THE PATHOLOGY OF THE REPRODUCTIVE TRACT OF LAYING PULLETS AFFECTED WITH NEWCASTLE DISEASE. *Poultry Sci. 33:* 880-897. Illus. 1954.—In this study based on observations on 73 laying pullets (48 White Plymouth Rocks experimentally infected, 6 White Leghorns naturally infected, and 19 White Rock healthy controls), temporary cessation of egg production was a prominent feature. Mortality among artificially infected birds was 6%; in the 3 groups of naturally infected birds it was 0, 7, and 25%, respectively. All birds developed positive hemagglutination-inhibition titers and the virus was isolated from ovarian and magnal tissues at the 5th and 7th days of experimental infection and the 7th day of symptoms in natural infection. Cessation of egg production was for periods varying from 7 to 22 days. The virus infection resulted in oöphoritis characterized by marked degeneration or atresia of Graafian follicles, heterophilic and eosinophilic infiltration and, later, lymphocytic hyperplasia in the ovary. The follicular degeneration led to arrest of ovulation and its subsequent oviposition. Salpingitis was observed in the various sections of the oviduct characterized earlier by heterophil infiltration, edema and pericapillary hemorrhage and, later, by lymphocytic hyperplasia; however, the only section which appeared to suffer functionally during the return to production was the uterus or shell-secreting portion. As a result, shell weight and thickness were decreased in spite of normal serum-calcium levels. Incidence of imperfect and soft-shelled eggs laid by infected birds was significant at the 5% level. Decrease in shell thickness at the 35th and 56th days after exposure was significant at the 1 and 5% levels, respectively. Other egg qualities were not appreciably altered. The artificially infected birds showed a body weight decrease which was significant at the 1% level.—*C. C. Morrill.* (Biological Abstracts)

KLIMES, B., and R. SVEC.

ASCARIDIASIS AND ITS TREATMENT WITH BENZINE. (ASKARIDIOSA DRUBEZE A JEJI THERAPIE.) *Bulletin of University of Agriculture and Forestry, Brno. (Acta universitatis agriculturae et silviculturae, Brno.) Rocnik 1955, III (XXIV):* 21.—Pharmaceutical benzine is highly effective, quite nontoxic anthelmintic drug against poultry Ascaridia and Taenia. It can be applied both into the empty and full crop in doses of about 2 ml per b.w. Parasites are repelled quickly, in most cases within 8 hours. Especially advantageous is

the application of benzine into the half-filled crop with the hypodermic needle through the skin.

A simple apparatus proved to be good for mass dehelmintization on poultry farms.

The effectiveness of benzine was proven by tests on 55 fowls in laboratories and on 61,790 fowls (hens, turkeys, geese), on poultry farms.

It is proven that the dehelmintization has no harmful effect either on the laying of eggs (6994 fowls were observed) or on the fertility or hatchability (20 hens and 138 eggs were observed).

The dehelmintization had favorable influence on the course of pasteurellosis in the infested poultry farms. Benzine is considered by us to be a more suitable and cheaper anthelmintic drug than the anthelmintics used till now.

MOORE, EARL N., J. A. BROWN, and R. D. CARTER. (Ohio Agric. Expt. Sta., Columbus.)

A NEW COCCIDIUM OF TURKEYS, EIMERIA SUBROTUNDA, N. SP. *(PROTOZOA: EIMERIIDAE.) Poultry Sci. 33:* 925-929. Illus. 1954.—A new sp. of coccudium, *Eimeria subrotunda*, was isolated and identified. Morphologically, it is characterized by its subspherical shape and the absence of a refractile granule. The average length is 21.77 μ and the average width is 19.81 μ. The average length-width ratio is 1:1.098 μ. The sporulation time is 48 hours at room temperature. The pre-patent period is 4 days. Poults infected with a single dose of sporulated oocysts, shed oocysts up to 12-13 days after the prepatent period. Poults under 5 weeks of age, when infected with massive doses of sporulated oocysts, failed to exhibit symptoms of infection and no gross lesions were observed. Coccidium-free chicks, guinea fowl, pheasants, and quail failed to become infected when fed sporulated oocysts of *E. subrotunda*. Turkeys solidly immunized to *E. subrotunda* were successfully infected with *E. innocua* and *E. dispersa*. These studies indicate the antigenic specificity of each separate species. —*E. N. Moore.* (Biological Abstracts)

RANBY, P. D., and A. H. OUTRIDGE. 1954.

"CRAZY CHICK" DISEASE. *Qd. agric. J., 79:* 285-290.—Hereditary factors may be among the causes of "crazy chick" disease or encephalomalacia. Reference is made to an outbreak affecting 23 and 12% resp. of 2 out of 8 sire families, each of 120 chicks. Only one or two cases occurred in the remaining sire families. Breed differences have also been reported. In particular the White Leghorn appears to be more resistant than the heavy breeds. It is also suggested that genetic sex linkage may account for higher incidence of the disease in cockerel than in pullet chicks. (Animal Breeding Abstracts)

TAYLOR, D. J., J. GREENBERG, E. S. JOSEPHSON, and E. M. NADEL. (Nat. Insts. Health, Bethesda, Md.)

NON-PARALLEL CHANGES IN THE CHOLESTEROL AND ASCORBIC ACID CONTENT OF THE ADRENALS OF MALARIA-PARASITIZED CHICKS. *J. Clin. Endocrinol. 14:* 822-823. 1954.—(Nutrition Abstracts and Reviews)

POULTRY PRODUCTS AND MARKETING

CONTRERAS, ELISEO S.

A PRELIMINARY STUDY ON THE PRESERVATION OF EGGS BY REFRIGERATION UNDER PHILIPPINE CONDITIONS. *Philippine Jour. Animal Indust. 14:* 201-205. Illus. 1953.—On the basis of these observations, it may be considered that the physical structure of the chicken eggs can be kept in a fair state for at least 5 months at 35-38°F. and 60-65% humidity. The storage room should be exclusively

for eggs to prevent them from absorbing undesirable odor and flavor emanating from other products.—*Auth. summ.* (Biological Abstracts)

EVANS, R. J., S. L. BANDEMER, J. A. DAVIDSON, D. H. BAUER, and H. A. BUTTS. (Dept. Agric. Chem., Michigan State Coll., East Lansing.)

TRANSFER OF PROTEIN IN STORED SHELL EGGS PRODUCED BY HENS FED CRUDE COTTONSEED OIL. *J. Agric. Food Chem. 2:* 1077-1080. 1954.—A standard laying ration with 2.5 percent. crude cottonseed oil added was given to 10 laying hens housed in a battery. Eggs were examined fresh, after 3 months' and after 6 months' storage at 1°C. From microbiological analysis of the yolk and white for methionine, cystine and serine it is concluded that ovalbumin selectively migrated from the white to the yolk during storage.—*D. H. Shrimpton.* (Nutrition Abstracts and Reviews)

GUILLOT, G.

LA CONSERVATION DES OEUFS. [THE PRESERVATION OF EGGS.] *Ann Nutrit. Alimentation 8:* 503-529. 1954. (Nutrition Abstracts and Reviews)

LOPEZ, A., C. R. FELLERS, and W. D. POWIL. (U. Massachusetts, Amherst.)

SOME FACTORS AFFECTING GELATION OF FROZEN EGG YOLK. *Jour. Milk and Food Technol. 17:* 334-339. 1954.—The pH of fresh egg yolk was not affected by freezing and frozen storage. Changing the pH of yolks, cooking at different temperatures and time intervals, diluting and dehydrating the yolks previous to freezing did not inhibit gelation. Salt added to yolk prior to colloid milling, freezing and frozen storage, produced a yolk with a higher degree of gelation as compared to colloid milled samples with no salt added. Various emulsion stabilizers and destabilizers were tested. Sugar, salt and glycerol were effective in partially preventing gelation. Eggs subjected to sonic and to supersonic vibrations, previous to freezing and frozen storage, showed a marked degree of gelation upon thawing.—*H. H. Weiser.* (Biological Abstracts)

MORRISON, MARY A., E. A. SAUTER, BARBARA A. McLAREN, and W. J. STADELMAN. (Washington State Coll., Pullman.)

SOME FACTORS AFFECTING YIELD AND ACCEPTABILITY OF CHICKEN BROILERS. *Poultry Sci. 33:* 1122-1125. 1954.—Eight breeds and crosses of commercial broiler strains were compared for yield of edible meat, flavor, and tenderness. No consistant differences were found between breeds or crosses with respect to evisceration loss or yield of edible meat. There was no significant difference between breeds or crosses as measured by tenderness and flavor scored by sensory panel or tenderness measured by the tenderometer. Variation within the breeds indicated the possibility of selecting strains with higher yield of salable meat and/or a higher percentage of edible meat.—*W. J. Stadelman.* (Biological Abstracts)

OBATA, YATARO, and KAGENORI MATANO. (Hokkaido U., Sapporo.)

THE COLORING OF BOILED EGGS. [In Japanese] *Jour. Japanese Soc. Food and Nutrition 6:* 109-110. 1953.—There often appears greenish black color on the surrounding surface of egg yolk of boiled hen eggs. This coloration increased when the storage of eggs was longer, and cooking time (10 or 20 minutes) and temperature (98-100° or 100-102°) were higher. The coloring was marked on alkaline side (pH 9.4-8.4) and no coloration occurred below pH 4.4, when the mixture of buffer solution and egg yolk was treated with H_2S. It was concluded that the coloration was due to the combination of Fe of egg yolk with H_2S formed from organic S-containing compound of egg white by alkaline reaction of egg white itself on boiling.—*Sin'itrô Kawamura.* (Biological Abstracts)

PAYNE, B. F. 1953.
CAPONS. *Bull. Kans. agric. Exp. Sta.*, No. 362.: 46 pp. (Animal Breeding Abstracts)

STADELMAN, W. J., E. L. BAUM, J. G. DARROCH, and H. G. WALKUP. (State Coll. Washington, Pullman.)
A COMPARISON OF QUALITY IN EGGS MARKETED WITH AND WITHOUT REFRIGERATION. *Food Technol. 8:* 488-490. 1954. —Egg quality, with and without refrigeration (refrig.), was determined at the farm and at various stages in the market channel to the time of purchase by the consumer by breaking samples from each shipment. Data were obtained on quality of eggs held with and without refrig. for periods up to 19 days. Starting with eggs of uniform quality, after 10 days there was a difference of about 6 Haugh units in favor of refrigerated eggs; after 19 days the difference was approximately 15 Haugh units in favor of the refrigerated eggs. Speed of movement of eggs through market channels was of greatest importance when no refrig. was used.—*W. J. Stadelman.* (Biological Abstracts)

THEVENOT, R.
LA CONSERVATION DES VOLAILLES. [THE PRESERVATION OF POULTRY.] *Ann. Nutrit. Alimentation 8:* 531-539. 1954. (with discussion 539-540). (Nutrition Abstracts and Reviews)

WHITTLE, T. E. 1954-55. (West of Scotland Agric. Coll., Auchincruive, Ayr.)
CHICKEN FOR THE TABLE. *Scot. Agric., 34:* 126-131.—The production of broilers is described with emphasis on the economic aspect. Data referring to the various crosses used at Auchincruive are tabulated. (Animal Breeding Abstracts)

WINTER, A. R., PATRICIA SHIELDS, LOIS MacDONALD, and INEZ PRUDENT. (Ohio Agric. Exptl. Sta., Columbus.)
IMPROVING THE KEEPING QUALITY OF EGGS DURING MARKETING BY HOT OIL TREATMENT. *Jour. Technol. 8:* 515-518. 1954.—The keeping quality of soiled eggs washed in cold water was greatly improved by agitation in a water bath at 144°F. or an oil bath at 152°F. for 2 minutes (min.). Oil treatment was superior to water treatment since it sealed as well as sanitized the shell. Short-time high temperature treatment (148°-152°F. for 2 min.) saved labor and was less detrimental to functional properties of the eggs than a longer period at a lower temperature (130°-140°F. for 10-15 min.).—*Authors.* (Biological Abstracts)

ZIEGLER, FRANK, J.V. SPENCER, and W. J. STADELMAN. (Washington State Coll., Pullman.)
A RAPID METHOD FOR DETERMINING SPOILAGE IN FRESH POULTRY MEAT. *Poultry Sci. 33:* 1253-1255. Illus. 1954.—A method for detecting spoilage in fresh poultry meat prior to appearance of odor is reported. Scrapings on the surface of the bird under the wings were made, using a wire loop and spreading the scrapings uniformly on a glass slide. These smears were fixed, stained with Gram's stain, and examined under a microscope to determine concentration of microorganisms. A highly significant correlation was obtained when days to detection of spoilage as determined by this method and as determined by detection of off odor were correlated. The spoilage was always detected earlier by the slime smear method.—*W. J. Stadelman.* (Biological Abstracts)

MANAGEMENT

BONADONNA, T.
IL SISTEMA "VERTICALE" NELLA POLLICOLTURA. [THE "VERTICAL" SYSTEM IN POULTRY REARING.] *Ital. Agric.*, April 1954, No. 4, pp. 15. (Nutrition Abstracts and Reviews)

COLE, R. K., and F. B. HUTT. (Cornell U., Ithaca, N.Y.)
THE EFFECT OF DUBBING ON EGG PRODUCTION AND VIABILITY. *Poultry Sci. 33:* 966-972. Illus. 1954.—The effect of removing the comb and wattles from 8-week-old White Leghorn pullets was determined by comparing the subsequent performance of 2717 dubbed pullets with that of 2768 non-dubbed controls. Birds of different genetic origins were represented equally in both groups. Dubbed and non-dubbed pullets were mixed at random throughout the test period from 43 to 500 days of age. No culling was practised. The surviving dubbed pullets laid an average of 185 eggs, or 3 more than their controls. Because of rather large normal variation in production between birds, this 3-egg difference is not significant. Dubbing had no consistent effect on age at sexual maturity. It had no effect on mortality, which was identical (28.9%) for both the dubbed and the control groups. Neither did it have any effect on adult body weight. The dubbed birds generally laid better during the cold seasons of the year from Nov. to April, but tended to do relatively less well during the subsequent summer. There were fewer hens with poor production records among the dubbed groups. Because of the consistently better egg production by the dubbed birds we believe that the slight advantage was due in part to the dubbing.—*R. K. Cole.* (Biological Abstracts)

FRENCH, M. H., and H. P. LEDGER. (Joint Animal Indust. Div., East African Agric. Forestry Res. Organiz.)
THE DEEP-LITTER SYSTEM. *East African Agric. J. 20:* 40-44. 1954.—Three groups of pullets were placed, a month before laying began, in deep-litter houses (1) and were given a dry mash of maize-meal 44, pollards 30, alfalfa meal 10, meatmeal 10, cottonseed meal 10, salt 1, limestone 3, bonemeal 2 and dried yeast 2 parts. They also received a daily grain feed of equal parts of oats, millet and barley, scattered on the litter. Three comparable groups were in deep-litter houses and had access to grass runs (2); and 3 further groups were in houses with bare-earth floors with access to grass runs (3). During the growing season green grass was hung in the intensive deep-litter houses, and during the dry season kale was hung in all pens.

Over a laying period of 12 months the mean egg yields in houses 1, 2 and 3 were 146, 146 and 162, respectively. There was no difference in feed consumption between the groups.

Variations in egg production through the year could not be related to the prevailing weather. The 3 groups used for each system of housing were one of Cambars, one of Legbars and one of Welsummers, and there was a suggestion that the breeds differed in their adaptability to deep litter.—*K. J. Carpenter.* (Nutrition Abstracts and Reviews)

KENNARD, D. C., E. N. MOORE, V. D. CHAMBERLIN. (Ohio Agric. Exp. Stat., Wooster.)
THE ROLE OF FLOOR LITTER MANAGEMENT IN NUTRITION AND DISEASE PREVENTION OF CHICKENS. *Poultry Sci. 33:* 1063-1064. 1954. (Nutrition Abstracts and Reviews)

LACZA, B. 1954. (Res. Inst. Breed. Farm Anim., Godollo.)
(Russian and German summaries)
KACSATOJASOK KELTETESE SZEKRENYES GEPEKBEN. [INCUBATION OF DUCK EGGS IN CABINET INCUBATORS.] *Allattenyésztés, 3:* 263-269.—The régime of incubation is described by which a hatchability rate of 76.08% was obtained.—Abstract of summaries. (Animal Breeding Abstracts)

SMITH, A. H., W. O. WILSON, and N. PACE. (Dept. Poultry Husb., Univ., California, Davis.)
THE EFFECT OF HIGH ALTITUDE ON THE GROWTH OF TURKEYS. *Growth 18:* 27-35. 1954. (Nutrition Abstracts and Reviews)

SMITH, R. M., N. R. GYLES, and J. C. GILBREATH. (Univ. Arkansas, Fayetteville.)
THE INFLUENCE OF PRODUCING SEXES SEPARATELY ON GROWTH, FEED UTILIZATION, AND DRESSED GRADE OF BROILERS. *Poultry Sci. 33:* 1082. 1954. (Nutrition Abstracts and Reviews)

WILSON, WILBOR O., and ALLAN WOODARD. (U. California, Davis.)
FEEDING SPACE REQUIREMENTS FOR YOUNG TURKEY POULTS. *Poultry Sci. 33:* 1278-1279. 1954.—Young turkey poults were given 1" or 2" of feeding space during the first 8 weeks. Groups with 2" of feeding space/bird were significantly heavier at the end of 8 weeks.—*W. O. Wilson.* (Biological Abstracts)

GENERAL

CAMPOS, A. C. 1954
COMMERCIAL-SCALE POULTRY PRODUCTION IN CEBU. *Philipp. Agric., 37:* 9-15. 1953.—Cebu is the foremost poultry-raising province in the Philippines. Native or "Bisaya" fowls predominate. They resemble the Indian Game Fowl and the wild jungle fowl in appearance and size. Although small, they have broad meaty breasts. They have no uniform colour pattern, although black is most common. Bearded fowls, or those with beards and crests like the Houdan breed, are not unusual. Kept in a semi-wild condition, native fowls are nervous in temperament, but are preferred because they are hardy and can better stand neglect. Around towns and on commercial farms are found S.C. White Leghorns and New Hampshires, with a few Australorps, R.I.R.s, Barred Plymouth Rocks, Jersey Black Giants and Game breeds (commonly called Texas). Very little attention is paid to culling or selection of native fowls. Selection of cockerels is based principally on their fighting qualities; selection of hens is based on their ability to incubate eggs and brood and rear chicks. Other aspects of poultry production dealt with are feeds and feeding practices, disease, marketing and the outlook for the industry. (Animal Breeding Abstracts)

CAMBRIDGE UNIVERSITY SCHOOL OF AGRICULTURE, FARM ECONOMICS BRANCH.
PROFITABLE EGG PRODUCTION. *Farmers' Bull.* No. 17, Oct. 1954, pp. 24. Price 2s. 6d.—Now, more than ever before, prosperity in the poultry industry depends on efficiency of egg production. The trend of egg prices is discussed as an introduction to a general discussion on profitable management under existing conditions, and suggestions are made on the best policy and methods to be adopted. Hatching dates should be carefully selected and good laying stock chosen. While avoiding heavy capital expenditure on specialized equipment, the most productive system of accommodation should be chosen. Production costs should be minimized by paying attention first to the major items of feedingstuffs and depreciation, and ways of doing this without reducing production itself are described.—*T. D. Bell.* (Nutrition Abstracts and Reviews)

DOBSON, N. (Min. Agric. and Fisheries Vet. Lab., Weybridge, Eng.)
CHEMICAL SPRAYS AND POULTRY. *Agriculture (Gr. Brit.) 61:* 415-418. 1954.—The exposure of poultry to grassland or orchards regularly sprayed with some common chemical sprays may lead to a

serious drop in egg production in certain circumstances. (Biological Abstracts)

GARREN, HENRY W. (N. C. State Coll., Raleigh.)
A TECHNIQUE FOR QUICKLY REMOVING THE PITUITARY AND ADRENAL GLANDS OF DEAD CHICKENS. *Poultry Sci. 33:* 877-879. Illus. 1954.—A procedure for removing the pituitary and adrenal glands of young chickens sacrificed by bleeding is described. An improvised instrument, combining both scalpel and forceps in one tool, greatly facilitated the removal of these glands.—*Auth. summ.* (Biological Abstracts)

HILL, J. F., DICKERSON, G. E., and H. L. KEMPSTER. (Hy-Line Poultry Farms, Johnston, Iowa.)
SOME RELATIONSHIPS BETWEEN HATCHABILITY, EGG PRODUCTION AND ADULT MORTALITY. *Poultry Sci. 33:* 1059-1060. 1954. (Nutrition Abstracts and Reviews)

PAYNE, LOYAL F., and TOM AVERY. (Kansas State Coll., Manhattan.)
TEACHING FARM POULTRY PRODUCTION AT THE COLLEGE LEVEL. *Poultry Sci. 33:* 998-1004. 1954.—Methods used to organize and present subject matter for an introductory course in poultry husbandry at 5 land grant colleges in the United States and one provincial college in Canada are presented. The number of credits for the lecture ranged from 1 to 4. Three colleges offered a laboratory course to supplement the lecture and 3 did not. The course was required of all students in agriculture at 3 institutions and elective at 3. Enrollment in lecture ranged from 39 to 300. Twenty-three % of the students required to take the course made a grade of "A" in the lecture compared with 12% of "A"s for those who elected the course. All grades were much higher than the standard distribution for secondary schools. The number of questions for the final ranged from 12 to 300.—*L. F. Payne.* (Biological Abstracts)

RICHARDS, K. L. 1954. (Dep. Agric., Nicosia, Cyprus.)
POULTRY-KEEPING IN CYPRUS. *Agriculture [Lond.] 61:* 428-431.—There are about 1¼ million fowls and 50,000 turkeys in the island. There are small numbers of geese, ducks and guinea fowls. The main breeds are R.I.R., Light Sussex and indigenous types including Cyprus Black and Minorca or Malta Black. There are also many crossbreds. Poultry husbandry and various development schemes are briefly described. There are 3 main breeding centers from which purebred stock is distributed. In addition there is a Poultry Breeders' Scheme whereby registered breeders have to comply with certain regulations regarding purebreeding, recording and supplying eggs and stock to other breeders; in return they get priority for government breeding stock. The Cockerel Exchange Scheme provides for the replacement of local cocks by young R.I.R. cockerels. The Extension Scheme provides an advisory service of instructresses in certain areas. Each area contains a poultry breeding unit. There is an increasing demand for day-old chicks which is being met by increasing the incubator capacity of the 3 main breeding centers. (Animal Breeding Abstracts)

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The Swiss Branch of the World's Poultry Science Association organized an excursion September 25-28 to Bourg-en-Bresse in France to study the famous "La Bresse" table-poultry production. 31 members from Switzerland together with 8 members from Germany—the German Branch having been invited to join company with the Swiss Branch—and one member from Austria met at Bourg with their private cars. They were welcomed by the authorities of the agricultural service of the "Département de l'Ain" and were shown around through this beautiful and fertile part of France in a most amiable way. They had not only every opportunity to visit typical small-holdings, which are characteristic for the production of the "La Bresse" quality of table-poultry, the important table-poultry markets of Louhans and Bourg, where from 15,000 to 30,000 heads of poultry a day are sold to the processors, processing and packaging plants of different designs, but the agricultural service had also seen to it, that every meal was real evidence for the unsurpassable quality of the "La Bresse" table-poultry and an ever memorable demonstration of the best traditions of French cooking. It is most interesting to see in our time of mass-production of broilers this century-old centre of small-holding table-poultry producers, where intensive methods, modern mashes and mass-production are banned and where the authorities are convinced of the old traditional methods only being able to give the quality known all over Europe as the best one can buy. Only small-holdings are allowed. Every bird must be reared on free range and during the last 6-8 weeks of the fattening only corn, mostly white corn, and skim milk are fed. The results regarding the quality produced are certainly due not only to old-fashioned methods, but to the special breed used named "La Bresse," a moist soil free of lime giving fine bones and spending valuable free animal protein and to feeding practices giving a juicy, delicate and tasty meat with considerable fat deposition.

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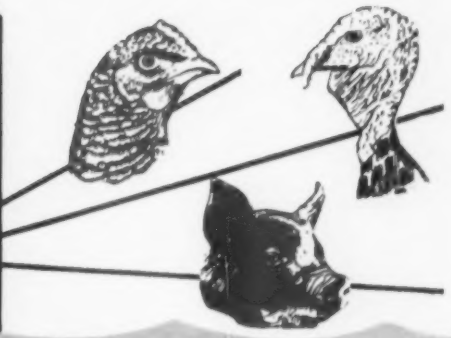

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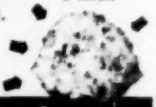

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MULTIPLE BLOCKING: Whitmoyer also discovered that these two synergistic drugs attacked the coccidial organism at not just one, but at several vital spots simultaneously. WHITSYN has a multiple action.

WHITSYN has been used successfully where hemorrhagic disease complicates the coccidiosis without further aggravating the tendency to hemorrhage. There is apparently less tendency to undesirable side effects because the synergistic action makes lower than normal drug levels so highly effective.

WHITSYN is available in three easy-to-use forms:

(1) WHITSYN-5 for control of outbreaks of coccidiosis

(2) WHITSYN-10 for prevention.

(3) WHITSYN-S for treatment in the drinking water.

We welcome your inquiries for additional data on WHITSYN and other Whitmoyer Products . . . or for consultation with our staff members on disease or nutritional matters.

Whitmoyer LABORATORIES INC
Manufacturing Chemists
MYERSTOWN, PENNA., U.S.A.

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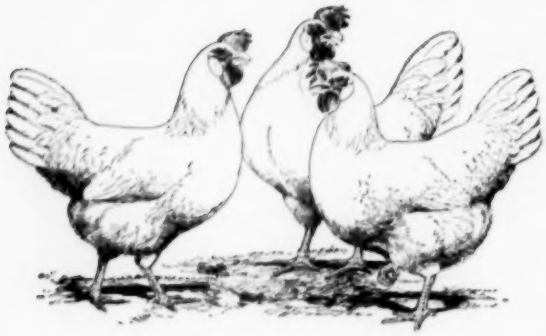
BRINGS HENS INTO

Top Egg Production–Quick!



MAKES THEM LAY TO THE LIMIT. New high-efficiency egg mashes will help make hens come into top production, quick—and keep them there. For actual tests at the Ful-O-Pep Research Farm show that 2,000 hens fed new high-efficiency Ful-O-Pep for the past 10 months have laid at the rate of 240 eggs per year on the hen-housed basis.

HELPS POULTRYMEN BOOST EGG PROFITS. Efficiency—not energy—is the key to egg profits. That's why Ful-O-Pep is carefully fortified to assure maximum assimilation of all nutrients . . . to enable poultrymen to get maximum efficiency from the feed they buy. Yes, nutritional leadership and proved performance is the story of Ful-O-Pep . . . a story of profit to poultrymen.

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. . . makers of dependable feeds for over 65 years

SQ® Drinking Water Remedies Offer Best Control of Coccidiosis

CHICKENS or TURKEYS

Prompt use of Sulfaquinoxaline stops outbreaks of coccidiosis in layers, replacement chicks, or broilers, often within 48 hours. Fast treatment at the first sign of an outbreak holds mortality, stunting, and culling of chicks and poults to a minimum.

Sulfaquinoxaline is effective against all damaging species of turkey coccidia. Sulfaquinoxaline drinking water therapy offers two other important advantages. It is quick and easy to use and it gets medication into birds even when they go off feed completely.

STOP BREAKTHROUGHS WITH SULFAQUINOXALINE

Despite the widespread use of preventive coccidiostats, breakthroughs occur when: (1) no coccidiostat or an ineffective one was used, or (2) other diseases have lowered the intake of medicated feed. Sulfaquinoxaline drinking water remedies should be used when such outbreaks occur.

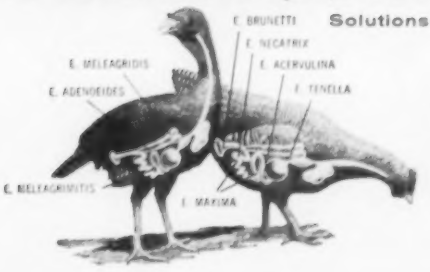
SULFAQUINOXALINE PRODUCT FORMS

Sulfaquinoxaline is available under various brands from reputable remedy manufacturers—in solutions, tablets, or solubilized powders. Whatever the coccidiosis problem the poultryman faces, there's a Sulfaquinoxaline product to meet his needs.

Stops mortality in acute fowl cholera

SULFAQUINOXALINE

Solutions • Tablets • Solubilized Powders



Effective against all damaging poultry coccidia

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AUROFAC *the antibiotic feed supplement guaranteed in potency and approved for disease claims.*

MEGASUL®

Nitrophenide

MEGASUL is the brand of anticoccidial agent preferred by many poultry scientists because, when fed continuously, it is the most effective drug for preventing outbreaks of coccidiosis in chickens. Recommended only for preventing coccidiosis outbreaks, MEGASUL is effective against all types of coccidiosis. Birds receiving MEGASUL also grow faster and more uniformly . . . make more efficient use of feed . . . are in better condition for vaccination . . . weigh more at market than unmedicated birds.

MEGASUL . . . *the leading anticoccidial agent proved in the laboratory and on the farm.*

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